WORK

An Illustrated Magazine of Practice and Theory

FOR ALL WORKMEN, PROFESSIONAL AND AMATEUR.

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VOL. I.—No. 44.] SATURDAY, JANUARY 18, 1890. [PRICE ONE PENNY.

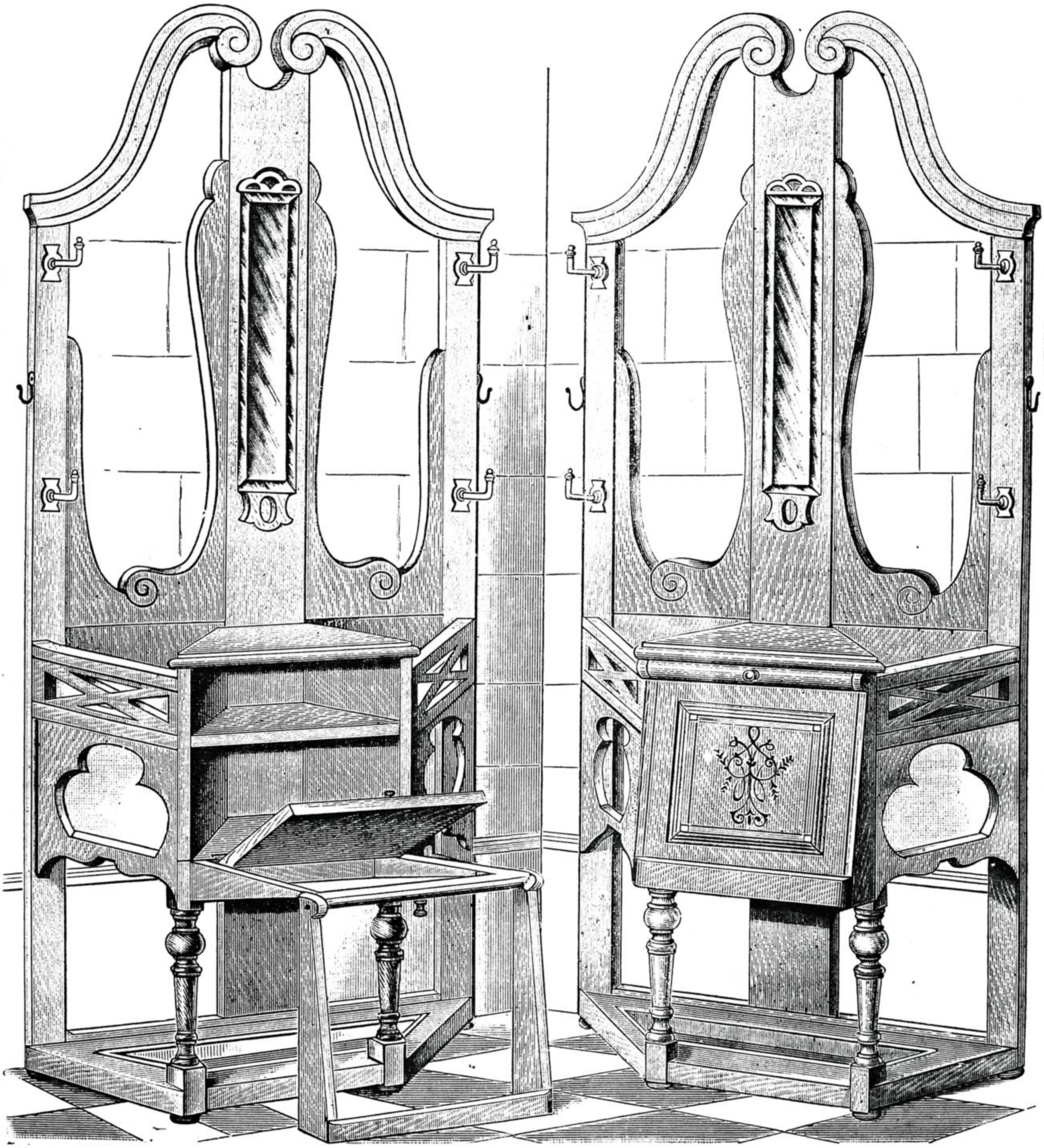

Fig. 1.—Combined Hat and Umbrella Stand with Cupboard open, showing Seat and Brush-Box.

Fig. 2.—Stand with Seat closed.

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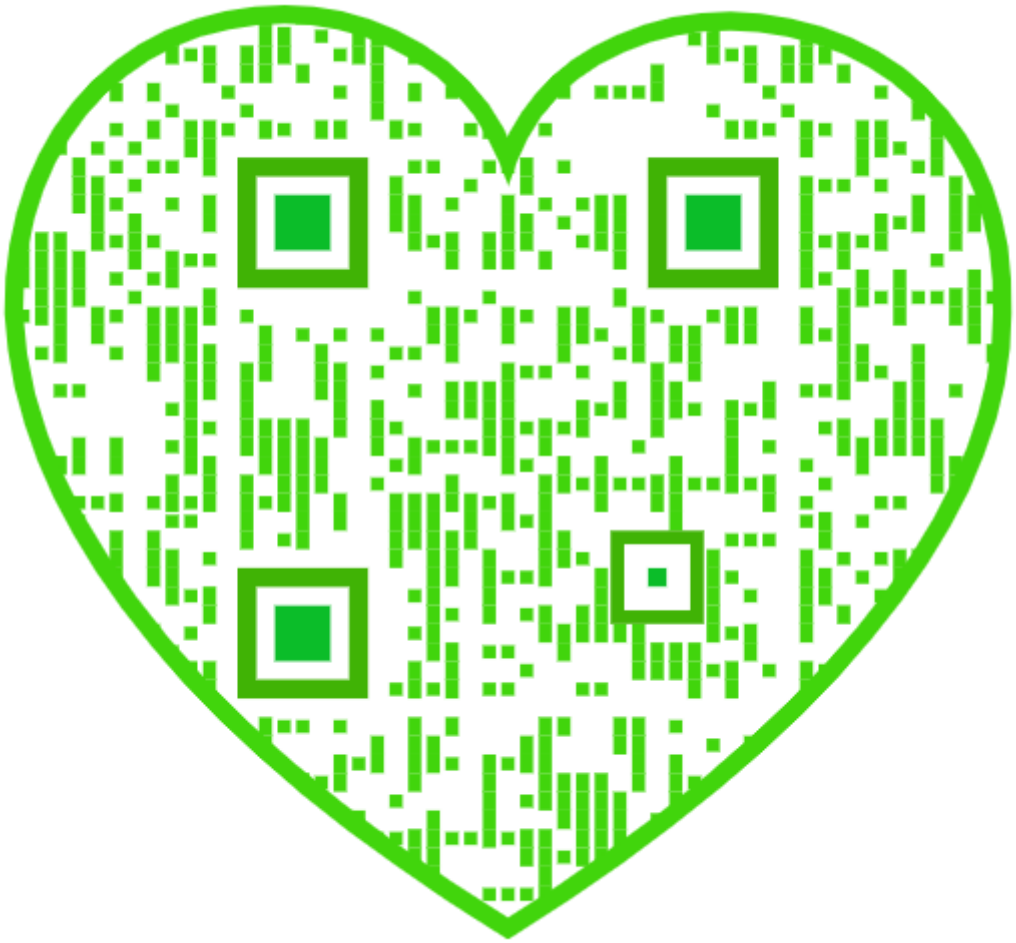


A COMBINED HAT AND UMBRELLA STAND AND HALL-SEAT.

BY JAMES SCOTT.

It is supposed by some that, with regard to the building and furnishing of houses, our ancestors were much better off than we at the present day are; and that the "hall" has slowly, but surely, degenerated into the "passage;" but this is not so—at least, if one depends upon historical reports and pictures. By "hall" I mean the large entrance apartment represented in drawings of old English mansions; and by "passage," the small narrow entrance to be seen in most modern dwellings. True it is that our forefathers built massive, grand, and commodious mansions, possessing spacious halls, compared to those that are generally raised nowadays; but they were occupied by the aristocracy; and the lower and middle classes were not, I believe, so well off in the matter of space and accommodation as the lower and middle classes of to-day are. The majority of houses, although being extremely picturesque when viewed from the exterior, were exceedingly far from comfortable to live in, and very few of them indeed possessed either a hall or passage, the entrance door generally opening immediately into the front apartment.

Although the nineteenth-century lower- and middle-class dwellings—of course, I am not speaking of the "slums," that caused so much public commotion a short time back—are not to be compared to those erected two or three hundred years ago so far as external appearances are concerned, we have a great deal to be thankful for in regard to internal arrangement; and as improvements are rapidly increasing with every year that overtakes us, I think the present "passage" will eventually develop into the more convenient "hall."

But as most dwellings possess merely the former of these two, we must remain content to bestow our care and attention upon it, and wait patiently for its final development. It is a noticeable fact that very few householders pay much attention to this part of their houses, one reason being, I presume, that they consider hall-stands are too large and bulky. This, to a certain extent, is true, but there is no reason why something smaller than the usual thing should not be used. Perhaps another reason is on account of the numerous petty thefts committed by idle and vagabond men who make a continual practice of abstracting hats and coats from their temporary resting-places, by opening the street-door by means of a key that the landlord of the house never gave to them. And as so many street-doors can be opened by the same key, thus certainly making the chances of losing apparel very great, perhaps Mr. Bonney, the gentleman who has been giving the readers of Work so much good and useful electrical information lately, will give us something that will sound the alarm when a coat or hat is being appropriated by any other than the rightful possessor.

The "stand" that I show in the present illustrations I have designed to be of more use than ornament. It is smaller than the average article, and can be put to more uses than even the larger patterns can. The outside dimensions are:—Height, 6 ft. 6 in.; width, 2 ft. 6 in.; distance from back to front, 13 in. And yet we have an umbrella-stand, hat and coat pegs, glove and boot cupboard, brush-box, looking-glass, and hall-seat!

There are several wives who can testify to the exhaustion of their patience and good humour by the entrance into the parlour of their husbands with wet and muddy boots, after a day spent, perhaps, in travelling about the dirty streets in rainy weather. With a hall-stand after this style, there is little doubt that these petty but not unreasonable quarrels would arise, as, having a seat attached to it, the husband could take off his dirty boots and place them in the cupboard, and put on his slippers, which should be at hand in the same cupboard. "But," I fancy I hear one of the before-mentioned husbands murmuring, "I always like, and always have, my slippers nice and warm." That may be so; but still one cannot always combine comfort with convenience, and I trust that the present suggestions I have offered will not be discarded on that account.

It will, doubtless, be observed that the supports for the seat fall into position when the door is opened, so that no complaint can be lodged against the article of causing too much trouble.

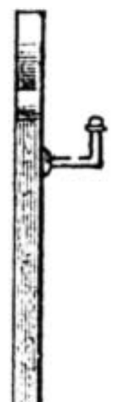
The door is really a box having three sides and a lid. This will form a handy receptacle for a clothes brush or brushes, or any other small and necessary articles; and the lid need only have a small knob to facilitate opening it, as the inside shelf, or—if made without a shelf—the shape of the cupboard, will prevent it from falling down when the door is up, thus doing away with the need of a fastening. The bottom of this box projects a few inches, and, when it is down, adds a firmness to it as a seat, and with the supports will really be all that is required; but to prevent accidents that might sometimes arise from the supports slipping, I should advise some part of the back of the stand above the boxes to be fastened to the wall.

As the shape of the cupboard will prevent very much strength to be obtained by joining, I have inserted at each side of the stand, in addition to the necessary top rail, another rail, with fretwork between the two, and a shaped piece of wood beneath them, to add a solidity to it.

Of course, variations of the same suggestion could be utilised. For instance: the cupboard might be square, and have no box in front; and a straight piece at each side could be cut out and pivoted to the top in a similar manner to that shown in the present design, both pieces being connected at the bottom in precisely the same manner. But it is always advisable to give the whole of the conveniences, and leave it to the reader to modify them according to his taste and requirements. Having said thus much, I will proceed with the dimensions.

The back framing should be put together first. The centre board will be 6 ft. long and 6 in. wide; the two side rails, each 5 ft. 3 in. long and 2½ in. wide; the bottom rail 2 ft. 1 in. long and 2½ in. wide; and the two pieces fitting in between the centre part and side rails, each 9½ in. long and 6 in. wide. The thickness of this framing should be about ¾ in. The centre part need not be cut for the glass, but a narrow frame with a rabbet on the inside cut for it, may be screwed on from the back of the centre piece. The glass might be 18 in. long and 4 in. wide. The shaped pediment need not consist of a moulding; a flat rail 2½ in. wide, with a few lines along it, will answer the purpose. The length of it, measuring straight, will be about 1 ft. 9 in.

Coming to the front, the top of the cupboard will be 19 in. wide on the front, and 7 in. at the back, and 12½ in. from back to front. The two sides will each be 13¼ in. wide, and 18 in. long; and if, as the cabinet makers say, "a good sound job" is required, the various boards should be either ⅝ in. or ¾ in. thick. The length I have given for



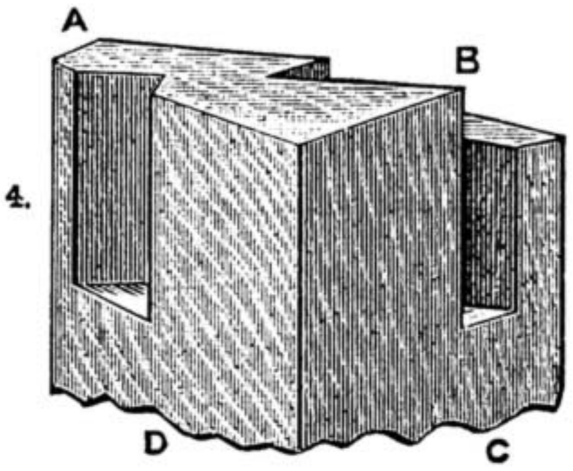


Fig. 4.

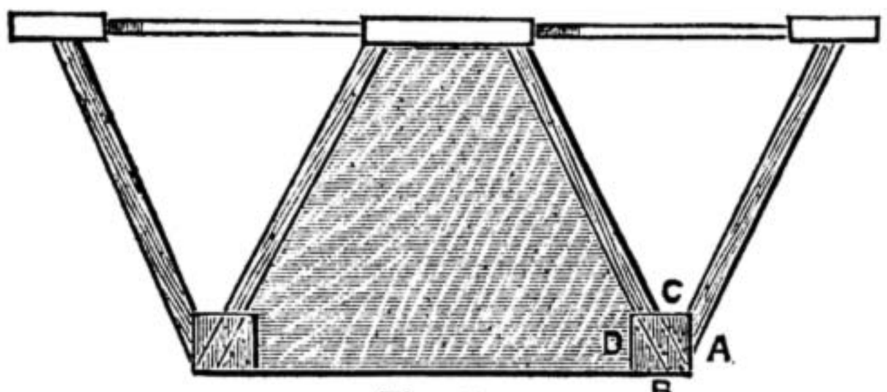


Fig. 6.

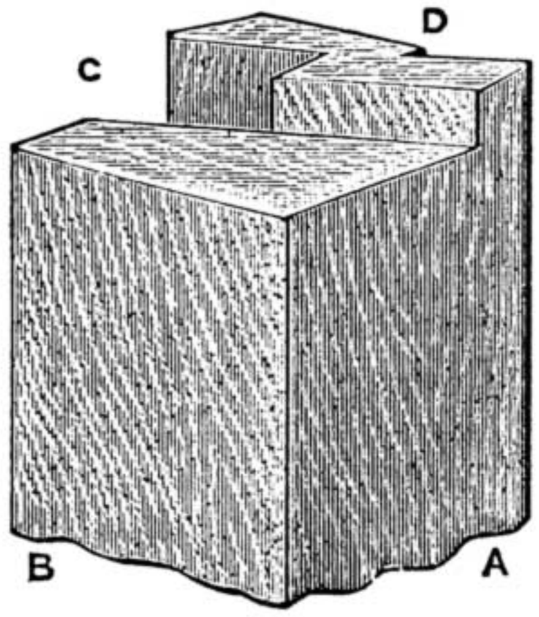


Fig. 5.

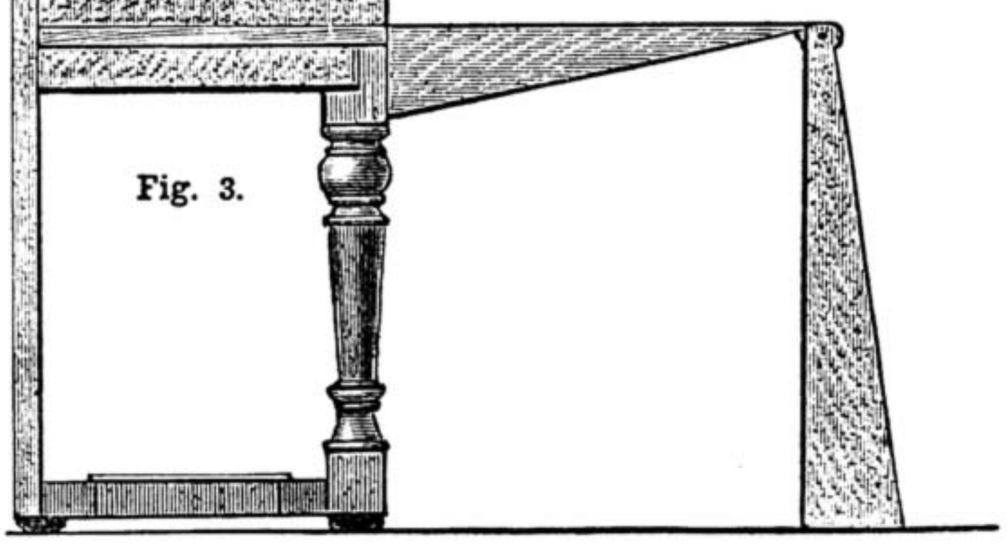


Fig. 3.

Fig. 3.—Sectional View of Stand (scale, 1 inch to 1 foot). Fig. 4.—Method of cutting Leg Blocks for Joining to Carcass: Back View. Fig. 5.—Ditto: Front View. Fig. 6.—Plan of Stand (1 in. scale). Letters in Figs. 4, 5, 6 show correspondence of Parts.

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the sides of the cupboard allows for an inch or two to be joined into the pillar blocks. The shelf and the bottom of the cupboard will each be 16½ in. wide on the front, and 4½ in. wide at the back. The front of the brush-box will be 16½ in. square, projecting to a distance of 3 in. or 4 in. at the bottom. Three narrow sides and a lid complete this box. This lid should not be hinged right at the back, but a few inches from it, to a narrow piece firmly joined there. The thicker the parts of this box, the better and stronger it will be when being used as a seat. At each side should be a triangular piece ¾ in. thick, with a small half-circular piece projecting at the narrow end and fastened to work on a pivot at the top. Both these rails should be united by another rail crossing them at the bottom.

One particular thing must be remembered concerning this movable part, and that is: the height to the top of the seat when down will be 18 in.; therefore the length of the supports will have to be the same, being a few inches longer than the front of the box.

Along the top of the outside of the door should be fixed a piece of wood, half-circular in section, to which the support is pivoted. When the door is opened, this support falls into position without any touching. The back of the brush-box will have to be very strongly hinged to the bottom of the cupboard; and the whole of the front will shut up *outside* the carcass. On the front the panel might be ornamented by having a little figuring incised or painted, which will add a finish to it.

The pillars should each be turned from 2½ in. wood, and the length of each, including the blocks, will be 18 in.

The bottom board will be 2ft. 6 in. long on the back, and 18 in. long on the front, and 12 in. wide. It should be 1½ in. thick, and cut to admit a tin or zinc pan, which can be of any size and shape; therefore I leave it to the reader's option. Whatever shape he chooses, he will, doubtless, be able to obtain it at almost any tinsmith's; or, if not kept in stock, he will have no trouble in getting one made to order. But if he reads the instructions given lately on Soldering, etc., he will have no very great difficulty in making one himself. A rim should run round the top of each, and will be sufficient to support it in its place if made to fit accurately.

The side rails will each be 13½ in. long and 1 in. thick. A piece of fretwork might be introduced between each pair, or even a few spindles would look well. The shaped pieces under these rails afford additional strength, and add to its appearance; and the shaped pieces at the back can claim the same advantages.

Four or six brass hat-hooks should be fastened on the front; and two smaller ones fastened one on each side to the thickness of the upright rails.

Being of a small size, I think it would be preferable if made in a dark wood or stained a dark colour.

Of course, the size of the entire article could be increased, but the sizes I have given for the seat should be carried out as nearly as possible. But it will be found that the shape of the cupboard and the position of the side rails allow for the introduction of a great number of umbrellas and walking-sticks; and that ample room for the purpose required will be found in the cupboard.

The side rails, too, instead of being quite straight, as I have shown them, could be curved; but unless the sides and top of the cupboard were curved in a similar manner, such a proceeding would spoil the symmetry of the article, upon which its appearance depends a great deal, and which I have been compelled to consider as secondary.

SIGN-WRITING AND LETTERING.

BY HENRY L. BENWELL.

PERSPECTIVE MODIFIED AND ADAPTED TO THE REQUIREMENTS OF THE SIGN-WRITER.

IN the course of his every-day routine of business, the student will often have, not only to paint the various styles of perspective letters such as the examples given with this chapter, but he will also occasionally have to treat his whole subject from a perspective standpoint, and I am now going to show him how to practise for and execute this department of his work. In sign-writing we cannot, in many cases, carry out the strict rules of perspective, consequently a violation of those rules is the result; but, although we cannot follow the true laws of perspective as laid down by the writers in the various text-books on the subject, I would urge the sign-writer to make himself a complete master of the art, so that by having the various problems at his finger ends, he will readily be able to make them conform to sign-writing requirements.

Of course I am not going to attempt in these pages any instruction on the principles of perspective in general: that would require treatment as a separate subject; all I can do is to point out a few examples of sign-writers' perspective as they occur to my mind at the time of writing; but should the reader care to study the subject seriously, I can recommend a small handbook by the Rev. Henry Lewis, viz.: "The Principles of Perspective," explained and applied in a series of graduated exercises; and also the chapters on perspective for letter and sign-painters in Mr. Davidson's work, "House-Painting and Sign-writing." Those who followed my advice in the earlier chapters of this series, and made themselves a black-board—and I know there are many who have done so, from letters received—will be able to work out the various problems and practise the various letters with the greatest facility.

Most writers, I am bound to say, have but a very crude knowledge of perspective: just sufficient, in fact, to enable them to carry out their designs with a passable amount of truth; but occasionally we see a glaring slip, either through want of knowledge of or a wrong conception of the proper application of perspective lines to the purpose in view. Certainly, a little knowledge of this subject is better than none at all, but what little the student does learn he should take care to be perfect and correct in, and he then may get on fairly well. The best sign-writers use as few lines as possible in order to give themselves freedom of action and plenty of scope in carrying out their designs. The beginner should follow the same course, otherwise he will be considerably hampered in his movements, and an awkward stilted job the result. Both linear and aërial perspective may be applied to sign-writing, and with plenty of practice on the blackboard the student may become so proficient and expert as to be able to entirely dispense with the various complicated lines in putting letters in perspective on the sign, trusting to the educated eye alone. A difficult arrangement or design for a sign executed in perspective should always be drawn out in true perspective on paper, and to scale. This work is best done at home, where everything for use is at hand, including mathematical instruments, squares, and drawing board. When finished in this way, the workman may transfer his design in its enlarged form to the signboard, converting or adapting the perspective as the height and position of the signboard may require.

In sign-writing, as in picture-drawing, there is but one point of sight and one horizontal line for each line of letters. Now, only the other day I saw, in London above all places, a perspective sign which contained at least three points of sight, which is of course absurd, as the spectator can only be at one point at one and the same time, and cannot see the first row of letters from one point of view and the second row from another point all at once, yet the sign-writer in this instance must have thought so. In lettering of this description all the top and bottom lines must incline to one vanishing point, such point being situated on the horizontal line, which I will explain by the aid of a diagram (Fig. 61).

We will take an oblong piece of paper, and for simplicity draw the horizontal line right across the centre, from A to A. The vanishing point is next decided upon, and in this case it is at B, and in the case of raised or shaded letters there must necessarily be another vanishing point on the left, as the lines of the thicknesses run in an opposite direction. This point is at C. This second point has nothing to do with the actual body of the letters, and is only called into use for the shading, so it does not contradict the statement just made. The next thing is to decide upon the height of the first letter on the left, and having drawn this in, we strike two lines, D, D, from the top and bottom, respectively to the vanishing point, B, and between these two lines the letters must be kept. On referring to the diagram, it will be seen that the letters not only diminish in height but also in breadth as they recede towards the vanishing point, B. The outline of the thickness for each letter must retire towards the point C, as shown by the dotted lines. In Fig. 65 is given a specimen of work treated in the way just described: this is for an advertising sign over an office, but a much more effective way of treating a perspective subject of this class is by the method shown at Fig. 62. For some descriptions of work this way of treating a sign is superb, and it makes a most attractive and catching advertisement. In Fig. 64 we have an instance of the point of sight being in the centre of the board at A, and a vanishing point on either side at B, B. There being seven letters in the name *Higgins*, the second *g* is consequently the middle letter, and the size of this being determined upon, it is drawn exactly in the centre of the board, and the vanishing lines drawn on each side accordingly. A short sign, rendered necessary by cramped space, is a good subject upon which to apply this method, and it is made more showy and complete by the addition of an oval border. It is, I am aware, a very difficult proceeding to strike perspective lines on a signboard, when the vanishing points are situate some distance outside the margin of the sign—and in a great many cases it would be impossible to do so—but there is a method of transferring perspective lines from a scale drawing on to a larger surface, which is both easy and accurate. I have used this plan for some years in scene-painting, and although I have never done so, feel sure it could be put

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Fig. 56.—Italic Alphabet: Capitals.

Fig. 57.—Italic Alphabet: Small Letters.

Fig. 58.—Egyptian Alphabet: Capitals.

Fig. 59.—Perspective Egyptian Alphabet: Capitals and Numerals.

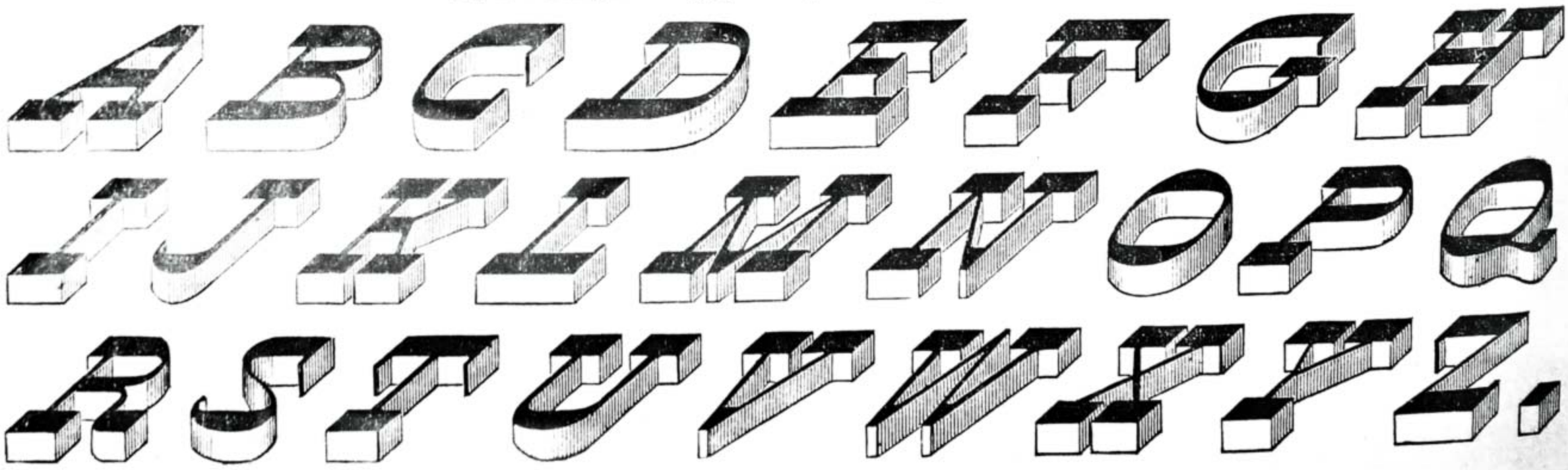

Fig. 60.—Perspective Italian Alphabet.

to the same use in lettering, with a slight modification. It is with deep regret I cannot lay this plan before my readers, as I feel it would prove of immense use to all sign-writers, old and young; but as it would take much space to describe, and require two rather large diagrams, I can only say I may incorporate the subject in a separate article at some future date. Referring back to the point of sight, I should remind the student that in raised and shaded letters, this point is generally on the extreme right of the sign, and for this reason: By standing opposite the centre letter on a signboard, consisting of wooden projecting letters tacked on to the board, it will be noticed, on referring to Fig. 63, that we can only see the front surface of the centre letter, and not the sides; in the letters to the right we see only the front and left side of the letter, and in the letters to the left of the centre the front and right side of

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such letters. Now, this is of course perfectly true perspective, but we never see it, nor follow such a rule in lettering. If, however, we stand to the left of the sign, we at once catch all the left-hand edges, and if we go to the extreme right we see the right-hand thicknesses. This also is correct perspective, the point of sight being in the first case to the left and in the second to the right; we cannot have this point in the centre, but we may have it right or left, and the former is the one most general in use. But even here the sign-writer cannot follow the rules of true perspective in shading and raising his letters,

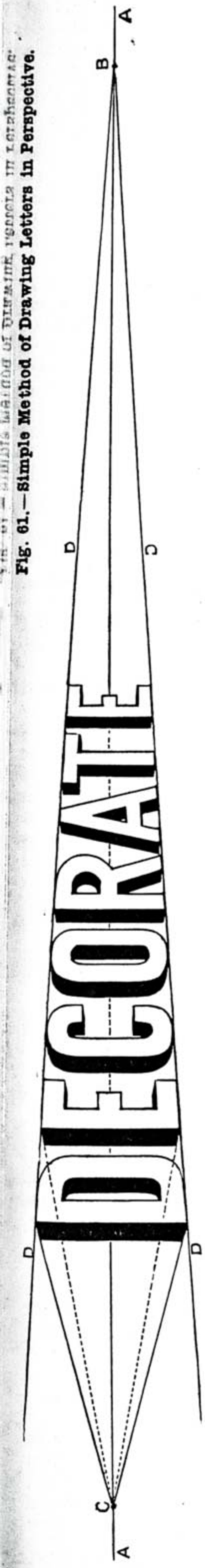

Fig. 61.—Simple Method of Drawing Letters in Perspective.

for if, in this work—in contradistinction to the drawing of the body of letters in perspective, as described earlier in this chapter—he made use of one vanishing point only, which in this case would be the seat of the eye, situated much below the row of letters, and also in the first place arranged the thickness of the first or nearest letter, to slant off at an angle of 45°, arranging his vanishing point accordingly, and struck the perspective lines for the thickness of each letter, from this point, he would find each thickness, being a greater distance away than the preceding one, would have a greater angle, or become more oblique in each case; and moreover, if the letters were strictly drawn, the thicknesses or edges should be made narrower. It, therefore, follows that we cannot carry out this method on a signboard, as although perfectly correct for other art purposes, it would in this case entirely destroy the symmetrical appearance of the sign. The general practice, therefore, is to have a fresh vanishing point for each thickness, which in effect means that most sign-writers draw all their receding lines in shadows and thicknesses at an angle of 45°. A good practical man can do this with the eye alone, but I should advise the beginner to make use of a set-square for the purpose, as nothing looks worse or spoils a job quicker than badly shaded letters: nothing, in fact, puts a really perfect letter out of the perpendicular or gives it a tumble-down appearance more than a wrong raising or thickness, from a modified perspective standpoint. It should therefore be remembered that although each letter on the same line is blocked on perspective principles, these perspective lines are only applicable to each separate letter in the row.

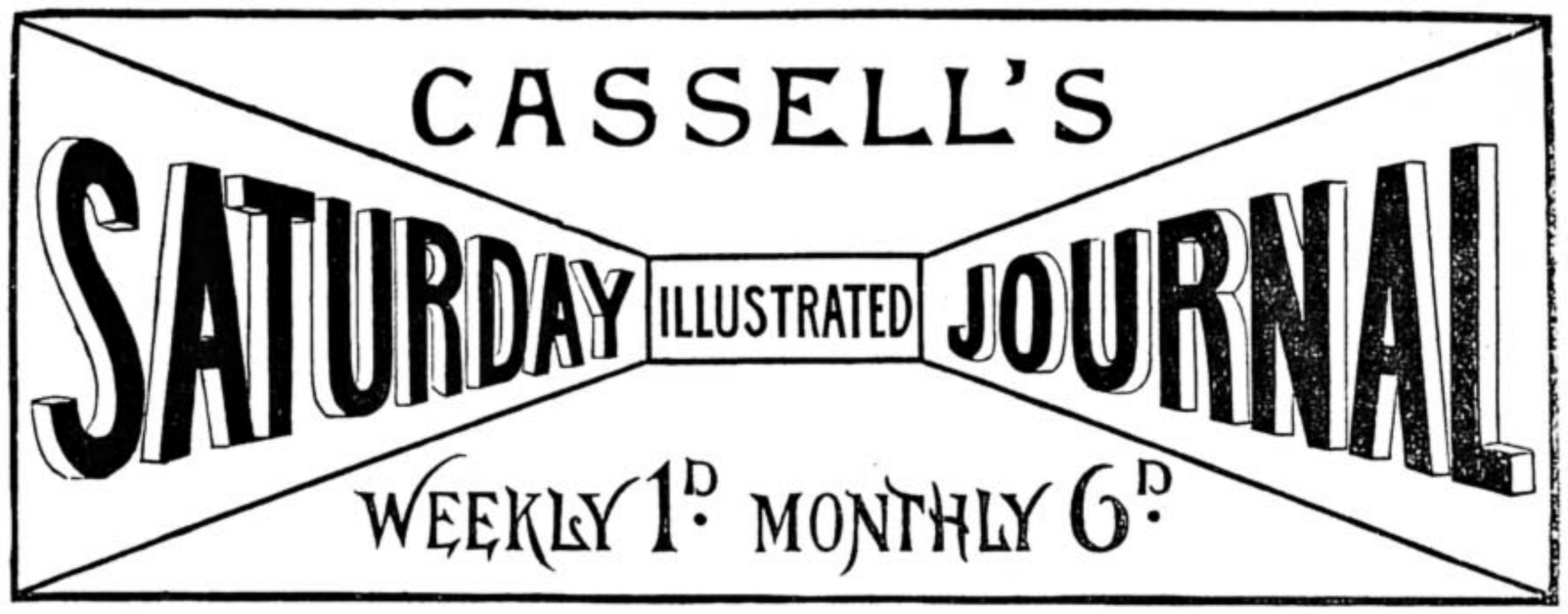

Fig. 62.—Simple Example of Perspective Treatment for a Sign or Advertising Board.

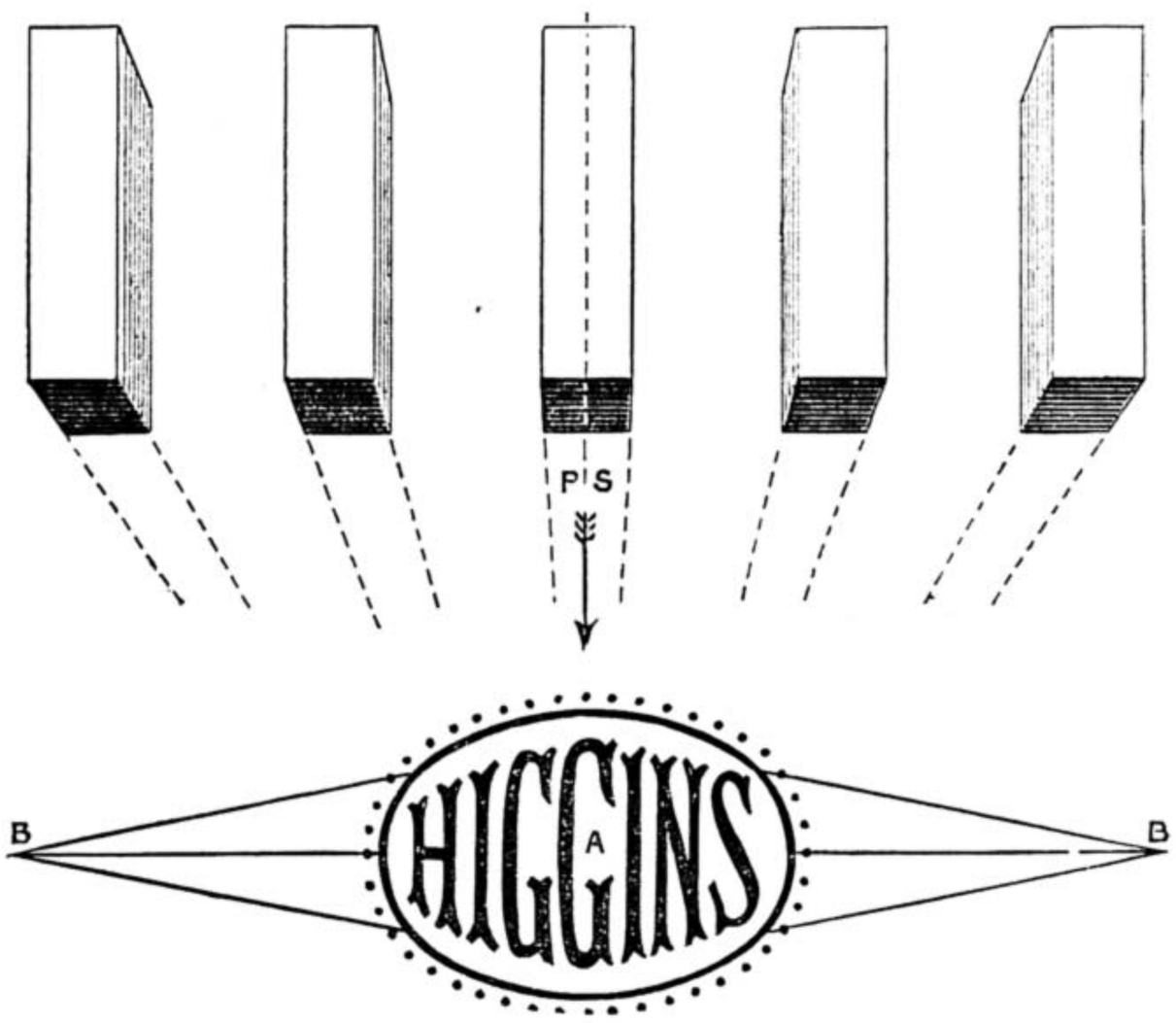

Fig. 63.—Perspective Lettering with Point of Sight in Centre. Fig. 64.—Letter I in Blocked Letters and its Variations of Perspective as viewed from Point of Sight in Centre as it recedes from that Point, showing impossibility of following the Strict Rules of Perspective in Sign-writing.

Although blocked or raised letters must therefore of necessity be treated upon perspective lines, it may to a great extent be left to the writer's discretion as to what angle of perspective he uses for different sets of alphabets, but he must take care that all letters on the same line have the same angle or inclination. Most writers find the ordinary set-square with an angle of 45° to be the most useful for setting out the proper inclination of the thicknesses, and if the student will put the set-square on the top line of each row of letters with the slanting edge downwards, and just touch the top corner of the letters, he will get the best of perspective lines for his purpose, and if he then moves the set-square along so that it touches each corner in succession, he will get every part of the block on the same inclination of perspective. Mr. Wm. Sutherland recommends this plan as the best possible way for the student to educate both the eye and the hand, and upon this subject there can be no greater authority than this veteran in the decorative arts, who wrote upon sign-writing over forty years ago, and whose latest work, "The Art and Craft of Sign-writing," is now looked upon as the standard work upon the subject by the whole of the profession.

I have necessarily only touched upon a few simple questions in this chapter on perspective; to do so in a thorough and

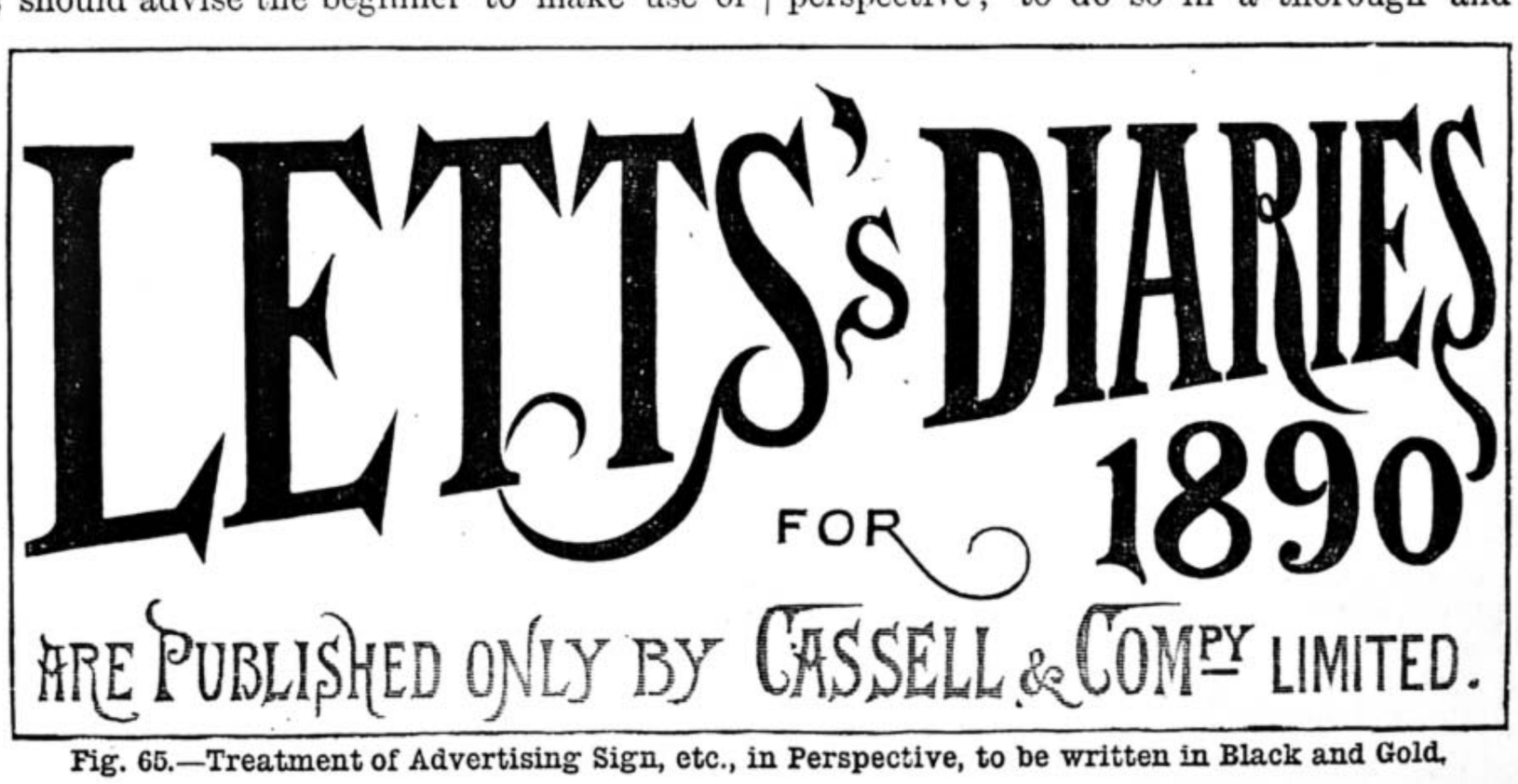

Fig. 65.—Treatment of Advertising Sign, etc., in Perspective, to be written in Black and Gold.

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complete manner would be impossible with the limited and valuable space at my command, but my readers can find more advanced matter in the book mentioned above. In my next chapter on light and shade, my readers shall have the benefit of some portion of this gentleman's ideas, as far as I am able to express them in writing. I give with this chapter Italic and Egyptian alphabets and two complete perspective alphabets (Figs. 56–60), in accordance with the wish of several correspondents, which will, no doubt, prove of value in actual practice.

SOMETHING MORE ABOUT TAKING OUT A PATENT.

BY A CONSULTING ENGINEER.

[*** The following has been sent to us by a Consulting Engineer of high standing and wide experience, and will be valuable to all who are interested in this subject, as it deals with certain aspects of "Taking Out a Patent" which were left untouched or nearly so in the previous paper under this title.—THE EDITOR.]

POPULAR IGNORANCE IN REGARD TO PATENTS—GRANT OF A PATENT NO PROOF THAT IT IS A PROPERTY—WHERE THE VALIDITY OF A PATENT IS ASCERTAINED—A SOUND AND VALID PATENT A VALUABLE PROPERTY—INVALIDITY ONLY DISCOVERED AT A LATER PERIOD—LEGAL OPINION OF A LEGAL WRITER ON SPECIFICATION—ANY ONE MAY PREPARE AND LODGE HIS SPECIFICATION—IMPORTANT POINTS UNKNOWN TO OR NEGLECTED BY SUCH—"UNPROFESSIONAL" AGENTS—DANGERS OF SUCH—ABSOLUTE NECESSITY FOR A CAREFUL SEARCH AS TO NOVELTY, AFTER SPECIFICATION IS PREPARED BUT BEFORE LODGING THE SAME, AND WHY—ILLUSTRATION OF COSTLY RESULTS OF NEGLECT OF THIS COURSE—GREAT INJURY DONE TO PATENT PROPERTY BY NEGLECT OF PROPER PRECAUTIONS AND THE WORK BEING DONE BY UNQUALIFIED PERSONS—IMMENSE AMOUNT OF VALUABLE PROPERTY AND MONEY WASTED—COST OF PATENTS INCREASED UNDER NEW LAW—HOW AND WHY—A USELESS AND INSUFFICIENT PATENT DEAR AT ANY PRICE—KNOWLEDGE, EXPERIENCE, SKILL, AND ABILITY SHOULD BE PAID FOR IN PATENT AS IN OTHER WORK—"CHEAP AND NASTY."

AMONGST the many popular fallacies of the present day, and one that is too often the cause of injury to the practitioner, and a great nuisance to other people, is the prevalent idea that *when* an "inventor" has contrived to get his "invention" accepted at the Patent Office, and obtained the grant and seal, he has *therefore* got a valuable *property!* The article of "C. C. C." in WORK, of Nov. 16, 1889, will evidently tend to perpetuate this fallacy, inasmuch as it omits to notice the principal and most important points relating to a patent; and would, without the admission of the writer, show to any man of practical experience and knowledge of the subject, that it could only have emanated from an "unprofessional patent agent," or a mere amateur, and is a good illustration of the truth of the old saying, that "a little knowledge is a dangerous thing," more especially when he illustrates his peculiar and profound knowledge of patent matters by telling us, that "if we require protection for the Colonies, as well as Great Britain, it will be marked A^1." If this *were* true, it would be A^1 indeed! It would have been thought, and expected, that, in these days of general and gratuitous information, and extensive and general setting forth of individual abilities as competent instructors of an unenlightened public, it would have been known that *each* colony of Great Britain has *its own Patent Laws*, entirely *independent* of the Mother Country, and *each* requires its own special treatment. Truly it may be said that the class the poet speaks of as not hesitating to do what angels fear is not yet extinct.

Now, it should never be forgotten that, in granting a patent in Great Britain, the Government does *not* in *any way* assume *any responsibility*, or *guarantee* the *validity* of the patent; this it throws on the applicant, who is presumed *before* he makes his application to know *exactly what he wants or requires*, to have *ascertained exactly what he may apply for*, to have made *suitable investigation* to have *decided this point*, and found whether his idea or plan is *anticipated*, and *how*, and to *what extent* he must *modify* them so as to prevent his patent from being *valueless*, and enable him to shape his demands, and *properly* to describe, illustrate, and secure that which he is entitled to, and to have had his title, specification, description, drawings, and claims, so *properly* and *fully* prepared, with *all* necessary points *so clearly explained and defined*, that when he has got the patent, he has *then* acquired a property.

The value and validity of a patent can only be ascertained and proved at a *later* period, if it has not been clearly ascertained before, either by the discovery that some other person has a *prior* claim to the "invention," that it has been *already published*, or that the *incorrect* or *insufficient* preparation of the title, specification, drawings, or claims, prevents it standing the test at the Law Courts, or else that the specification, etc., of the patent have *not* been made to cover the *most important parts* in the "invention."

A sound and valid patent for a really useful and practicable invention, when *well* considered, described, and illustrated, is of the greatest value, and an inventor should spare neither *time*, *trouble*, nor *expense* to obtain such; and if he has any confidence in his plan will most certainly do so, seeing that they are the title-deeds of what may prove to be a most valuable property. If a man purchase an estate, a house, or other property, he is generally extremely careful to have all the papers and documents prepared and examined with the greatest skill and care; but in the case of Letters Patent, this does not seem to be thought of, although they are in reality the title-deeds to prove his right to the invention, which make it a property, define its limits, explain its powers, and enable him to resist successfully any encroachments on his property or his rights.

It should never be forgotten that the discovery of the advantages which would have resulted from doing things in a *proper manner at the first*, is only obtained when the patent is *lost*, or its utility so damaged that it becomes virtually useless, and that *no expenditure at a later period*, unless only *a portion* of his invention may be wrong, when a disclaimer may be entered, can compensate for this deficiency at the commencement.

To show that this is true, and also how carefully such matters require to be done, inventors, "unprofessional patent agents," amateurs, law writers, law stationers, copying clerks, and the motley host of such as consider themselves quite qualified to advise on inventions, and prepare the documents, drawings, etc., should carefully bear in mind what a writer on the law of patents (Mr. C. Drewry, barrister-at-law) has said on this subject. "The most difficult perhaps of all legal documents to prepare is a specification of a patent; and for this reason, that it fulfils a *double* function. It is an explanatory direction to *workmen*, which must be couched in *language intelligible to them*, and sufficient to teach them *how* to produce the patented thing. It is *also* a document supporting *legal title*, and *as such* is subject to the same rules of construction of the language as are applied to any legal instrument."

It is quite true, as "C. C. C." states, that "any inventor who can express himself intelligibly in pen and ink, and can make a mechanical drawing, or who has a friend who can help in either or both ways, may get his patent without the intervention of an 'acknowledged agent,' and *secure* (?) his rights without running into any unnecessary or unknown expenditure," and *if* an inventor *did* or *could* do so, then no one would do wrong in following this course; but before doing so, he should carefully bear in mind that in law a specification is held to be *bad*. 1. If its *terms* are *ambiguous*. 2. If *necessary* descriptions are *omitted*. 3. If *parts* claimed are *not original*. 4. If things are inserted to *mislead*. 5. If the drawings are *imperfect* or *incorrect*. 6. If *one* of *different* ways or of different *ingredients* named *fails*. 7. If the *things* and *mode* described are *not the best known to the patentee*. 8. If the *old* parts are not *properly distinguished* from the *new*. 9. If the claims are *too wide* and not sufficiently explicit.

All these points, it must be remembered, are *not* decided by the employés at the Patent Office, but are considered and settled by *lawyers* who have to regard things in the manner described by Mr. Drewry, and here, and here only, the rights of an inventor, the value of his property and what he is entitled to, are inexorably defined and decided. From this it will be seen how little the results of the labours of "C. C. C."—whilst acting "in the capacity of agent, none of his work as such has failed, and he believes he has been successful chiefly because in his specifications and drawings he has kept in view the primary and fundamental objects of the patent laws," in getting the papers through the Patent Office—can influence in any degree the results of the ordeal such have to pass through under the rigorous sifting of the Law Courts. *When* he can produce *one* patent of which he has prepared the specification, drawings, etc., that shall have passed unscathed through this, *then* he may boast of being "successful," and of his understanding of the "primary and fundamental objects of the patent laws."

It is an imperative necessity for any one desiring to obtain a sound and valid patent, and to obtain a property therein, *after*, in the words of "C. C. C.," he has "decided on the most fitting title," and whether we are to speak of it as an "invention" or an "improvement," to "sit quietly down with a sheet of paper before us, and as simply, straightforwardly, and clearly as we can, draw up a description of it. If it will admit of such aids to verbal description, we should make rough drawings as we go on, marking them and our manuscript with letters, so as to render reference easy. While thus engaged, we should bear in mind the rule already laid down—that the object of our description and descriptive drawings is to so explain our invention that, from them alone, any person may, at any future time, be able to make the article, or to perform the process which we are describing. If we do this, we do all that the Patent Office requires of us. The most experienced agent can do no more;" he should *at once*, as he will *then* be in the position to do so, institute a most *careful* and *analytical* search through all the specifications *relating to the subject*, in order to ascertain how far his

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invention or improvement is novel, and how far it is not novel, so that he may protect himself and define and obtain his rights by lodging *proper documents*. If he *fail in doing this*, all the acceptances at the Patent Office, all the grants of a patent, will *not* create a *property* if he fails in this respect, as it will, undoubtedly, do in ninety-nine cases out of a hundred—and more especially when manipulated in the manner, and on the lines, laid down by an "unprofessional" agent.

Some few years since, an attempt was made to float a company to purchase a French "invention" for propelling tram cars by means of compressed air passed through a vessel of hot water just before it entered the cylinders, so that it became heated and expanded thereby; but, though a fabulous sum was to be given to the Frenchman for his "invention," and all stamps were paid for the whole term of the patent, *no search as to novelty was made*; but an "eminent" engineer, who was, evidently, profoundly ignorant of what had been done before in this direction, was mightily struck by it, and reported it as being one of the greatest inventions of modern times!

A short time after, the company was brought out, and prospectuses issued, but, in a few days, it was satisfactorily proved that this so-called "invention" of the Frenchman had been patented by an. Englishman so far back as 1797 and 1801, and also by others at later dates, but *all long before* the Frenchman; consequently, the whole thing fell through, leaving the promoters, financiers, and the "eminent" engineer on the *wrong side* of several thousand pounds, with the chance of becoming wiser men for the future; but, whether they have, or will, use the chance, has not been ascertained.

Few persons can know how seriously the value of patent property has been, and is being, injured through "intelligent inventors," sometimes aided by "unprofessional" agents, or law stationers, or law writers, and copying clerks, preparing their own specifications, etc. The host of individuals of the above description who are ready, and push themselves forward as prepared, for the smallest consideration, to act the part of scientific mentors to "intelligent" and other inventors, and aid "unprofessional" agents, evidently, as well as the rest, participate, in most cases, in the popular belief that "anybody" can prepare a specification, and so create a property, and "everybody" is capable of advising thereon; and that if, after a little trouble, the papers are accepted at the Patent Office, all is right, and a great success at once achieved.

Where capitalists were once only too glad to invest in patent property as a safe and profitable proceeding, but few now will look at one, most having a just and wholesome dread of such articles, especially since we are flooded with the mass of "home manufacture," or the outcome of the transcendental abilities of "intelligent inventors," "unprofessional" agents, law stationers, law writers, copying clerks, etc., knowing full well that getting the papers through the Patent Office is *not* the *slightest proof* of the value of the property, nor a guarantee that it will pass through a trial at law.

Intending patentees should be extremely careful not to fall into the hands of the extensive fraternity who profess to obtain a patent for a *fixed sum before even they have seen the subject, know the mode, or what is proposed or requires to be done*, and have no idea beforehand of anything relating to the matter! A moment's reflection should satisfy any one of ordinary intelligence that such offers are about on a par with the benefits to be derived from falling into the clutches of those amiable and philanthropic individuals who offer pecuniary accommodation *without any security!*

An inventor, if he *really* has a good thing that is worth anything at all, will rarely fail in being able to find a reputable and respectable practitioner who will arrange terms with him for carrying out his wishes in a proper manner, and at a fair remuneration for his services; but, as every labourer is worthy of his hire, and few men of ability and experience work for the advantage of other people and their benefit, simply for amusement, it is only right that they should receive a *fair* return for their skill, experience, and labour.

It would, no doubt, astonish "unprofessional" agents and "intelligent" inventors if they could see, at one view, the immense amounts of valuable property and money that have been *lost* and *wasted* entirely through the absurd proceedings in regard to taking patents that have existed and still exist, far too generally, in the mind of the average public, "intelligent" inventors not excepted.

That there are incompetent and unprincipled parties occupying themselves about taking patents is well known, and too many "intelligent" inventors have been victimised by such; but a better means of maintaining and increasing the breed cannot be devised than that of considering that the work of a mechanic should not receive higher pay than that of the labourer; hence it will be found that there will be only labourers to do the work, and the value of the work done will be nearly equal to the amount expended in obtaining it.

So far as the *cost* and *labour* required in obtaining a patent goes, under the new law, instead of being *reduced*, experience shows that they are really *increased*, inasmuch as the waste of time encountered in combating and removing the "objections"—too often absurd and frivolous; the "suggestions" far too often impracticable; and the "improvements" in nine cases out of ten of anything but this kind—proposed to be made by the employés in the office must be paid for, or else the person undertaking the work must be at the loss; whereas, under the old law, it was *not* the province of the law officers to occupy themselves with anything of the kind. In fact, except in the reduction of the stamps, inventors, patentees, and those engaged in preparing the documents, drawings, etc., were far better off, inasmuch as they knew *what* they had to do; *how* to do it, and *did* it; whereas, now, it is extremely difficult—if not impossible—to know or foresee anything, or to work to any established precedent; in fact, we have seen by experience that apparently the best qualification for employment in the Patent Office is the least possible acquaintance with, if not a total ignorance of, all matters relating to patents and the kind of work that has to be performed.

It has well been asked, "Of what good is a 'patent' which does not fulfil what should be the chief object to be secured by obtaining one, however 'cheaply' or at a 'low-priced' rate it may have been obtained, and the specification drawings, etc., have been got through?"

Do "inventors" and "intending patentees" ever give this point a moment's consideration, or ever remember the results of being one's own lawyer? "Cheap and nasty," most truly applies here.

"Cheap and nasty" is an old and true saying, but is a very expensive amusement when it is patent property that is played with. How much ought I to pay to secure the services of a proper person to create me a property in my invention? should be the ruling principle of an inventor; *not* where can I get my papers put through "cheapest," or at the *lowest* price. Practical knowledge, skill, and ability ought to be worth more than the labour of a copying clerk or law writer, which requires no brains, but merely aptitude in copying what is put before them.

OUR PRIZE BOOKCASES.

I.—A HANGING BOOKCASE.

For which the First Prize was Awarded.

BEFORE giving a description of how to make the above, I think it would be advisable to say a few words about the kind of wood that is most suitable; and as the cost of wood in this particular case is not of so much importance as the labour, I take this early opportunity of impressing upon my readers the desirability of using only the *very* best of stuff. It will be found for this class of work that the best material is always the cheapest in the end. For, if only one piece of stuff has to be thrown out on account of some defect after the time and labour have been spent on marking, sawing, planing, and setting out, it would most likely be found that it would have been cheaper to have given a penny or so a foot more for the wood in the first place, to say nothing of the delay. Where is the joiner or cabinet maker who has not, at some time or another, persuaded himself that a dead knot or shake would be either worked out, or come at the back, or that a bad edge would be rebated out, etc., in the working? and, at the last moment, when he had hoped to get his work glued up before knocking off, found that the knot did not come in the tenon, but right across the shoulder; or that the shake was just in the mortise; or, for some unaccountable reason, the sap was on the edge that was most seen, or that the bad edge was *all but* worked out by the moulding. And what is the result? let a piece in, and if it is hard wood the chances are that although it is cut out of the same piece of wood as the defective piece, it will come out a different colour when polished. One then sees the artistic polisher—with some mysterious compound in a receptacle concocted out of a piece of old glasspaper—endeavouring to match it by painting, but it is very seldom that it is matched properly. And the alternative is to get out a fresh piece, which means that it must be set out quite separately, after which it is found that the mortise-gauge, plough, fillister, etc., as the case may be, has just been shifted. Take my advice, use good stuff.

Now for a few precautions, tips, etc.

If it is made in walnut, oak, mahogany, or any hard wood and polished, be sure to have the spindles, finials, brackets, gallery rails, mouldings, etc., in fact everything possible, at least bodied up by the polisher before gluing up: should it be made in walnut, it would be better if it were dull, or fine polished.

If made in pine or American whitewood, stained, polished, or varnished, do as much staining, polishing, or varnishing, as you possibly can before gluing up.

It is also very necessary to take great

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care that there is no glue left on any of the joints, mitres, etc. It is better to put the glue on very carefully than to have to clean it off after it is dry, which is not only rather troublesome, but very often far from satisfactory, especially where there are many internal mitres. It will be found easier to wash any superfluous glue off before it is dry with a clean piece of sponge, dipped in hot water and wiped thoroughly dry, making sure to get rid of all signs of glue or glue water, or size; the act of washing off the thick glue with water very often causes a coating of size round the joint, and wherever there is a trace of this, the stain, etc., will not take properly. This washing may very likely raise the grain of the wood, but a few rubs with a piece of fine glasspaper will soon put it all right. In working reeds, mouldings, etc., with a scratch, or router, especially in soft wood, it is a very good plan to damp the reeds, etc., after first working, which will cause the grain to swell; and when it is dry they can be papered down. This to a great extent anticipates the action of the stain, and the rubbing down can be done much more readily and with better effect before the work is glued up. If it is decided to varnish it after staining, give the work two coats of patent size, rubbing down between each coat with a piece of soft rag or brown paper (it is better not to use glasspaper after the wood is stained if it can be possibly avoided), and varnish with flatting varnish, for stained work of this description looks common if finished with a glossy surface.

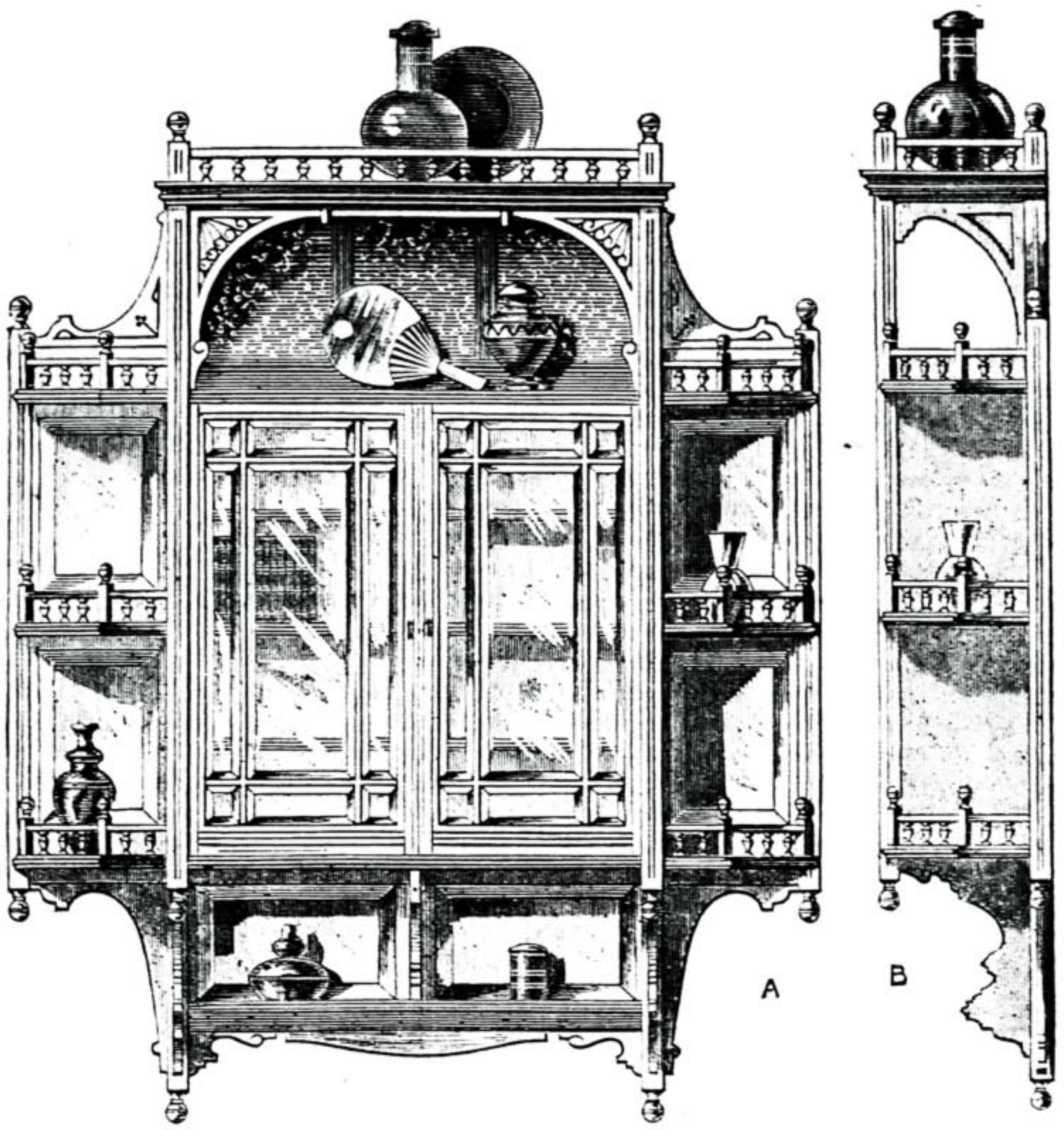

Fig. 1.—Prize Design for a Hanging Bookcase, to contain Two Hundred and Eight Volumes of "Cassell's National Library"—A, Front Elevation; B, Side Elevation (¾ Scale).

On no account use sappy wood, for it is generally found to come out very bad when stained.

As American whitewood is very nearly the same price as best pine, it would be better to use it for stained work, being not only harder than pine, but more adapted for fine work: and it, moreover, takes any stain beautifully.

A cheaper way of finishing it would be to enamel or paint it in suitable colours, on account of the advantage of being able to use up any odd piece of stuff, either hard or soft, provided it is sound. But again let me say, do all you can before gluing up.

I hope the above precautions will not be considered out of place; for it is just these little things that go to make or mar a job.

Whichever wood was used, it should be cut off as soon as possible, and stood about to dry, even if it has been cut some time.

Let us now suppose it has been decided to make it in pine. The first and most important thing to do is to take two pieces of thin stuff, and plane up one side and one edge of each; chalk all over the planed sides, and glasspaper across the grain: and after dusting off any chalk, etc., that

Fig. 2.—Wood for Moulding with "Tried-up" Mark on Face.

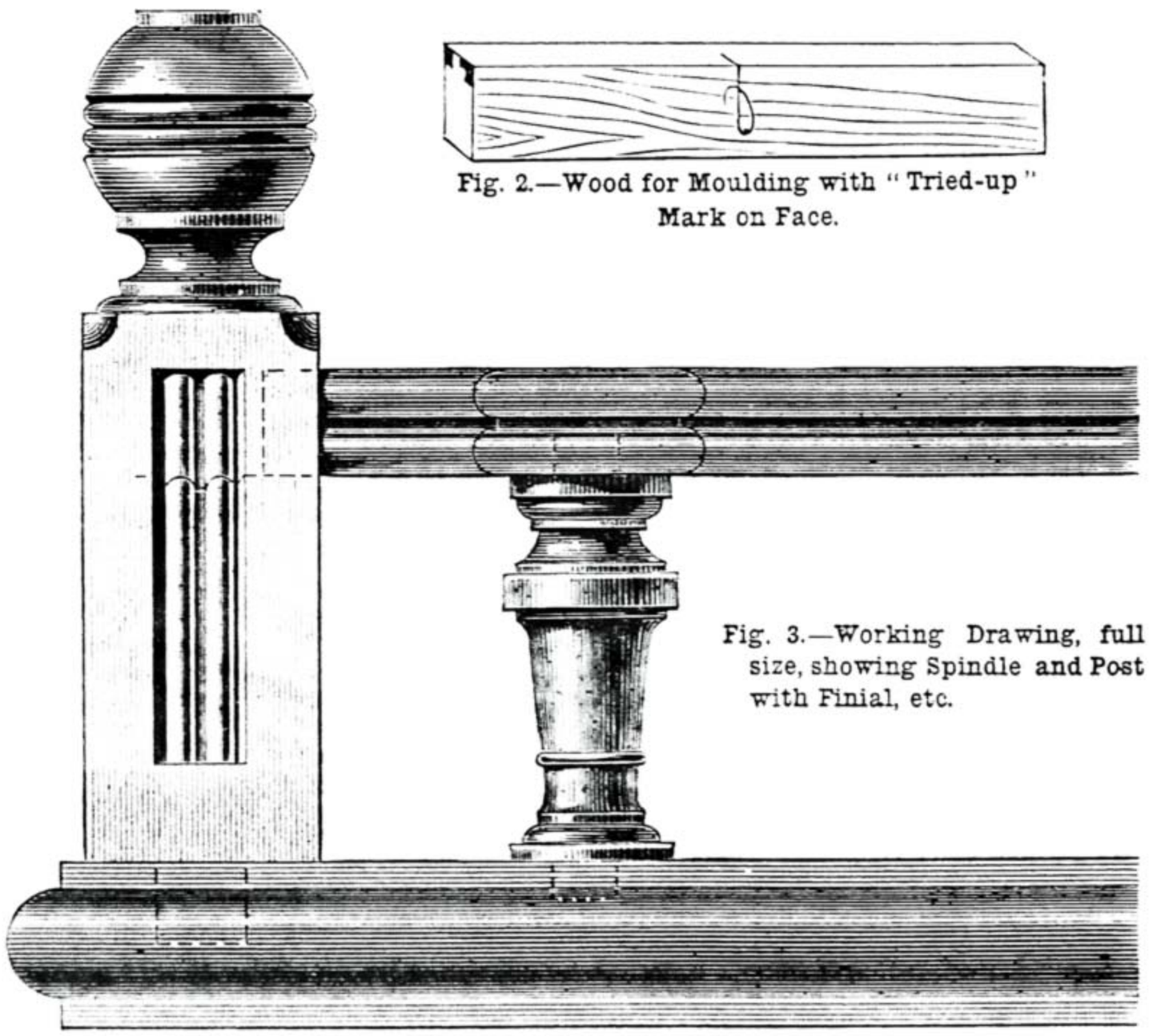

Fig. 3.—Working Drawing, full size, showing Spindle and Post with Finial, etc.

remains, set out on one the full-sized section marked height section on drawing, and the one marked width section on the other. These are called the rods.

To some, this may seem unnecessary labour, but I can assure you it is not, as will be seen as we go on.

Now, with the rods in front of you, mark off on a piece of paper every piece of stuff you require; clear the bench, keeping the rods ready for reference, and mark and cut out everything. If you take a shaving off all sides and edges before standing the pieces down, it will enable the air to get at the stuff better than if it were left rough; and the longer it stands about the better. This is the reason that I say, cut all the pieces out before doing anything else.

The next thing to do, is to properly plane and get out of winding one face of every piece, taking care that the edges or faces that have to have mouldings or rebates worked out of them are the best; and that the grain runs the way you wish to work the mouldings. Now square one edge, and put what is termed a tried-up mark on the face, as in Fig. 2.

You cannot possibly get the grain always to work as you want it, but a great deal can be done with a little care.

Then again, if you get it to work right for moulding and rebating, the chances are very much against its being right for reeding. But, as it happens in this case that you can reed from either edge, seeing that the reeds are parallel to the edges and the stuff is gauged to a width, and not too wide to allow the scratch to work, it would be better to make provision for the moulding, as that can only be stuck one way. Great care should be taken that the above tried-up mark is put on every piece of stuff as it is tried up; for it not only indicates which side has been got straight and true, but shows on which edge you originally intended to work the moulding, and it is from this tried-up side that all squaring, gauging, moulding, etc., is done.

Now carefully examine the rods, and if they have been set out properly, they will at once show the exact section of nearly every piece. We now proceed to gauge the widths of the various pieces: let us take the width rod first; this will give the exact widths of all the uprights, styles, columns, posts, etc.; next follow with the height rod, and this gives the exact section of shelves, rails,

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etc. Each piece should be marked as it is gauged, for instance, top rail of door—style of false back—front columns, etc., etc.; of course these marks may be as brief as is consistent with clearness.

The front columns, and the parts marked A in Fig. 7, should now be gauged to the exact thickness; and, as they are square, they should be gauged with the same gauge as the width before it is shifted. The small corner posts can be got out in any lengths, and cut up afterwards. This remark also applies to the pieces for the spindles, gallery rails, and terminals, or finials, at the top and bottom of columns. The shelves, uprights, brackets, styles, rails, and bars of doors, panels, rails and mullions, etc., of false back should now be thicknessed. The back columns and rails with the brackets, as shown in Fig. 5, need not be thicknessed; for, as they go against the wall, no purpose would be served.

We will now take it for granted that every piece requisite has been gauged and marked. The spindles, terminals, and corner posts, may now be set out and sent to the turner, the brackets sent to the fret cutter and carver; for, although it is very nice to do everything one's self, there appears to be such a great deal to do in a job of this kind, that I have often noticed the interest seems to flag. This, of course, does not apply to every case. If one has a lathe and can use it, by all means do the turning at home; and again, if you possess a fret saw, the same remark holds good for the brackets. I should certainly not advise any one to cut them out with a bow saw, and spend a day in cleaning up, when the fret cutter would cut them beautifully for a few pence, and a rub or two here and there with a piece of glasspaper is all that is required.

Now set out the back, the half of which is shown in Fig. 5. This is done by laying the various pieces on the rods directly over their places, and marking the widths, etc., of the pieces that intersect them.

Next, with a mortise-gauge, gauge for tenoning and mortising the rails into the uprights, etc., but do not mortise right through the uprights. The tenons can be held in their places by screws put in from the back. The rails, c c, should run right through, having the pieces cut out as shown, and halved on to the uprights. This will greatly assist in strengthening the back until the front part is glued on. Before cutting the shoulders, work the mouldings and reeds, stopping the latter where shown. The moulding on the uprights marked D, Fig. 5, had better be planted on (that is got out separately, and glued and bradded in their place). Bore all the screw holes for screwing on the shelves, brackets, etc., likewise the tops and bottoms of uprights to take the pins of terminals. The shoulders can now be cut, and the whole thing fitted together. After comparing

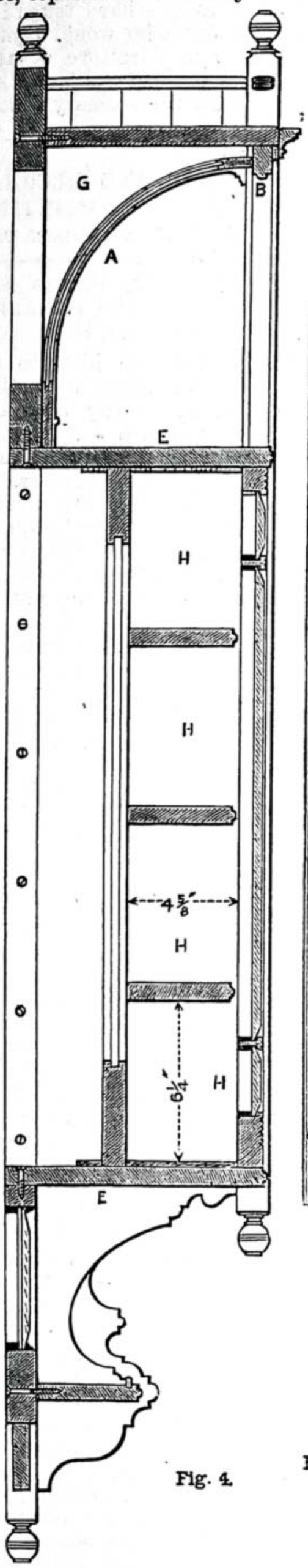


Fig. 4.

Fig. 5.

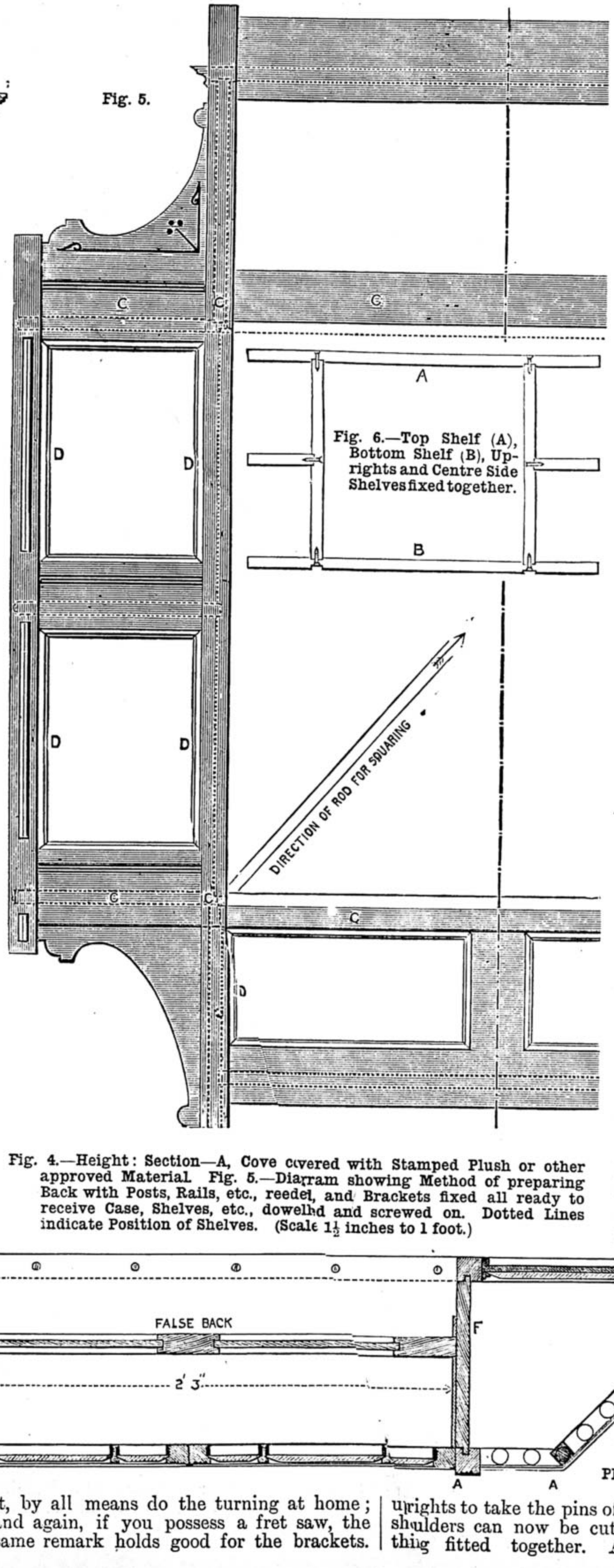
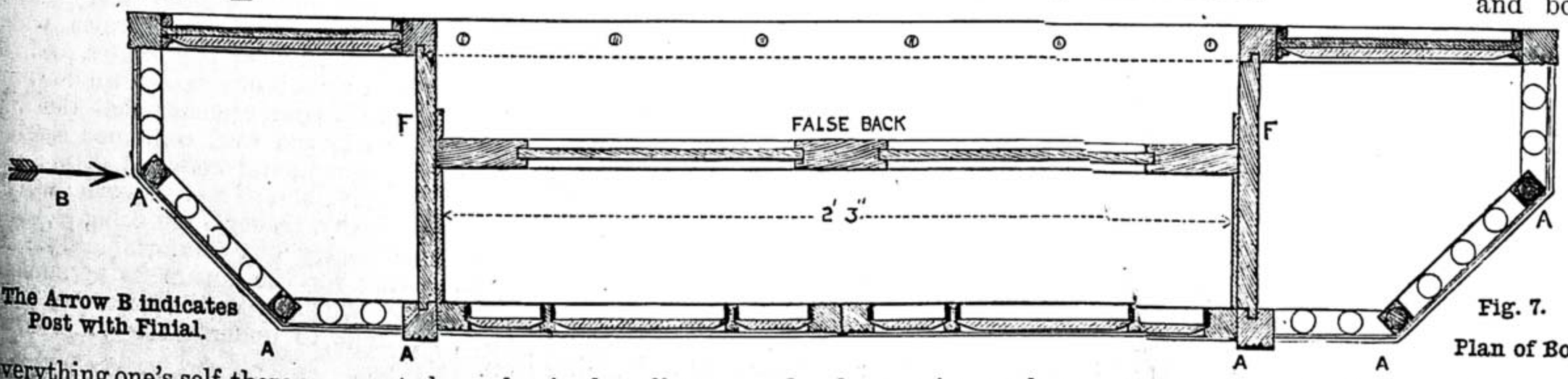


Fig. 6.—Top Shelf (A), Bottom Shelf (B), Uprights and Centre Side Shelves fixed together.

Fig. 4.—Height: Section—A, Cove covered with Stamped Plush or other approved Material. Fig. 5.—Diagram showing Method of preparing Back with Posts, Rails, etc., reeded, and Brackets fixed all ready to receive Case, Shelves, etc., dowelled and screwed on. Dotted Lines indicate Position of Shelves. (Scale 1½ inches to 1 foot.)



The Arrow B indicates Post with Finial.

Fig. 7. Plan of Bookcase.

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it with the rods, and trying a cramp across it to see if everything is all right, knock it to pieces, marking each piece as you take it apart, and stain and polish, etc., all the internal mouldings and edges that are seen. It can now be glued up and left to dry, care being taken that it is quite square and out of winding. The best way to square anything of this description is to try the length from corner to corner, and see if they are the same distance apart.

The directions taken by the rod for doing this are shown in Fig. 5.

The shelves directly above and below the doors marked E, and the uprights F in Figs. 4 and 5, should now be set out, letting the shelves, E, run by the uprights, taking notice that the shelves are wider than the uprights by the thickness of the back and front uprights. Groove the shelves to receive the uprights, and the underneath of bottom shelf to receive the brackets under uprights, also groove the uprights to receive the two outside middle shelves.

Now form the tongue on the front and back edges of the uprights to receive the front columns and to fix on to the back.

Although I show a tongue on these uprights, a cheaper and easier way would be to dowel them, especially at the back. Cut the corners off the shelves, set out and bore for the spindles, work the mouldings on the front edges, etc. (or plant them on). Prepare the two centre side shelves to match the overhanging part of shelves, E, bore for spindles and fit together, and it will then present the appearance shown in Fig. 6.

The lines of the mouldings are omitted, and the thickness of shelves and uprights exaggerated.

Now, clean off the face of the back, and fit these shelves, etc., in their places, screwing them on from the back, but do not glue them. All the rest of the work should now be got ready.

The doors and false back may now be framed up. Do not cut the bars of the doors through where they intersect, but halve them, giving the upright ones the appearance of running through. This may not at the first glance seem practical, but a little consideration will soon solve this difficulty. Bear in mind that the reeds should be worked before this is done or the shoulders cut. After fitting the doors together, take them to pieces, and stain and polish the edges, and let them stand till the last moment. The front columns should now be fitted on to the uprights, and the bottom and top shelves screwed on but not glued. Now fit in the cove. Although this is shown as if it were framed up, an easier method is to cut some rough brackets as at G in Fig. 4, and secure them to the under side of the top shelf and the back; now bend a thin board over them, and fasten it with screws, glued on and blocked from the back. Cut out and fasten and glue on false styles, rails, and mullions. Next, fit in the brackets at end of cove; these brackets should have a rough bracket fixed on the inside of them to carry the ends of cove. If the rest of the brackets are now fitted in, the whole may be taken to pieces and stained and polished on all visible faces. The cove brackets being only screwed to the rest of the work, but the thin board and the false styles, etc., being glued, will enable you to take the cove away entire, and the styles and rails can be stained and polished with the rest. For, as the panels are to be covered with plush, this will, to a certain extent, hide the inside edges where the polisher cannot get to polish.

The doors may now be glued up, and, whilst they are drying, get out the beads for the backs of the whole of the glass. Now clean up the doors; fit in the beads, which should be polished, etc., in the length before being cut (those behind the glass in the sides and bottom, of course, need not be polished). Next see that the moulding for the cornice (which, by the way, can be bought as well as the moulding round the edges of the shelves), gallery rails, spindles, corner-posts, terminals, etc., are all polished ready, and everything will be ready for fixing together. The more screwing and fitting you have done up to now, the easier you will get the whole together, for it is a great nuisance to have to bore holes or fit anything when you are gluing up.

In gluing the whole together, lay the back flat down, letting one part hang over the bench, to enable you to get a screw in here and there quickly when you put the front shelves, etc., on. Next cramp the two long shelves together, screwing the shelves up and down to the uprights. With a sharp chisel, scrape off any polish that may have run over the back edges, and also scrape the polish off the face of the back, or anywhere else where you wish to glue. Now screw the shelves and uprights on to the back, using but very little glue. Next follow with the cove, front columns, brackets, etc. The doors should now be fitted in and hung, taking care that the centres of the hinges project so that they are level with the face of the front columns, to allow the doors to open right back without straining. Next, fit in the shelves inside the bookcase, commencing from the bottom with the first piece of the linings marked H in Fig. 4, and build upwards.

As these linings also form the stops for the doors, close the doors from time to time, to see that they are all right. These side linings might run right up if desired, and not cut in between each shelf, thus saving a considerable amount of fitting where they meet in the centre and front of shelves. The shelves, in this case, could be supported on brass bookcase studs. Fit small flush bolts or any approved catch to the left-hand door, and a spring lock with fancy brass plate escutcheon to the right-hand door and drop handles, one on each door, for the sake of appearance. Hinge plates, screwed on the face of the doors, would be an improvement. Now unhang the doors, and stand them down ready for glazing, and fit and fix in the false back. The corner-posts and spindles should now be fitted in, and the gallery rails cut, bored, and fitted and glued on. It is hardly necessary to mortise and tenon or dowel these rails to the posts, etc., for, if they are fitted in tight and glued, a small pin driven in from the top will hold them. The bookcase is now ready for glazing. The plates of glass should be all blackened with a little size and lampblack on the edges along with the rebates, to hide the ragged edges. Two slips of baize glued on the front of backboards will prevent damage to the silvering. Next follow with the plush in panels of cove. One of the safest ways to fastening this to the panels is to glue the panels carefully with thin glue, and, just before it loses its stickiness, lay the plush on, patting it down with a soft brush. If the plush is put directly on to hot glue, the glue very often comes through and spoils the plush. Strong glass plates may now be screwed on to the back for fixing, and all that remains after glazing and rehanging the doors is to glue in the terminals to the front and back columns.

Although the above remarks are not written for the thoroughly practical mechanic, I have taken it for granted that any one who would commence to make a piece of furniture of this description at least understands a working drawing, and can use the ordinary bench tools.

PLAIN AND DECORATIVE HOUSE PAINTING.

BY A LONDON DECORATOR.

Mixing Oil Paints and Compounding Tints and Shades of Colours for Practical Use.

The chapters hitherto contributed to the pages of Work upon this popular subject have necessarily been of that elementary nature which may not equally command the interest of professional and occasional workers in paint alike. It can scarcely be expected that the amateur—who is only desirous to know how, at the least cost, he may make wholesome or how embellish his own little "castle"—will consider it necessary to master such detail of "source and nature" to the fullest extent, and with the same painstaking effort, as it is most necessary the rising apprentice or improver to house painting should so do. The reader who may have "scamped" my previous explanatory papers, and yet desires to make practical use of the "working" ones, will, however, doubtless soon be turning up back numbers, since each forward movement we now make will prove the knowledge contained therein to be the only foundation the painter can with confidence and security work upon.

In preparing oil paint, for whatever purpose it may be required, the first question to be considered is the nature of the surface to be painted, whether of wood, stone, or metal, and to what degree it is absorbent. Second to this only, we must remember the conditions of circumstance and position of our work, such as refer to expense, durability, and drying qualities; and lastly, we have the all-important matter of appearance and colour to bear in mind, whether our paint is for the first or last coat. We will therefore proceed to an imaginary mixing of paint for these different substances, bringing in therewith a lesson on their application to the walls and woodwork of a building.

Let us suppose, for the purposes of this practical lesson, that you, my reader, are the fortunate possessor of a small modern (but not jerry) built villa-residence, and that the builder employed has just completed, according to his specification, an addition to your house in the shape of a billiard-room. Furthermore, let us suppose that the apartment is principally lighted by a ceiling light; that the remainder of ceiling and the walls have been plastered with the usual finishing coat of lime-putty and plaster; that the enriched plaster cornice which frames the ceiling is of fine plaster, and the skirting and reveals of recessed windows are of Keen's or Parian cement; that the side windows are glazed with combined English sheet and ornamental coloured glass; our doors are hung, and of well-seasoned wood; and that, finally, reader, I am going to paint it in a temporary but comfortable style for you, leaving for the future its permanent decoration, which, with the whole of your villa, we hope to undertake together later on.

"But how about the tools?" may be your first inquiry. As, however, you will, for the

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present, but stand by and watch the worker, we can afford to have a special talk about them alone, confining our present remarks and attention to the mixing and suitability of paint and colour, not only for this billiard-room, but for any other part of the house.

All our plaster work being thoroughly dry, we have decided to finish it in oil paint, with the exception of the ceiling, which we shall distemper: that is, coat with water, or size, colour. The plaster cornice, with its cast enrichment, is the most absorbent portion; next to this comes the wall space, which the trowelling to its surface has made rather less "thirsty." The skirting, etc., made from Keen's or Parian—which are white and "hard-faced" cements—if well finished off, will absorb but very little oil, and therefore must be treated accordingly.

My first aim is now to stop the "suction" of cornice and walls before getting an incrustation of lead paint upon its surface, and to that end I break up genuine white lead and the best "patent driers," in proportions of about fourteen to one respectively, with a small wooden spatula or flat-shaped stick. Notice how, with a little raw linseed oil, I first get it to a thick batter, and then, when well broken up, I make it to the very thin working consistency which our first coating requires—of not more than four pounds of lead pigment to one pint of raw oil. As some of our cornice is rather elaborately cast, I thin a part of this paint with still more oil, and proceed to first coat the cornice only. In painting this portion, I take every care not to break the delicate plaster work, using light and suitable-sized paint tools to enable me to coat both recessed and prominent parts.

Here, perhaps, you may remark, "Why not use the same paint and cover the wall as far down as you can reach at the same time as the cornice?" To which I reply, explaining that "even then I could not reach to such a height from the floor, whilst the plaster on your walls being well prepared and trowelled, I expect to use the paint slightly thicker—or 'rounder,' as it is called in the trade—with advantage; and, further than this, that a full-sized paint-brush will be necessary to spread it over a large plain surface, whilst it will be advisable to strain my paint through a wire gauze paint strainer or piece of muslin before using it on walls or woodwork."

I now carefully work the paint through the strainer into another vessel with an old paint tool, and, meanwhile, explain how it is nearly always necessary to previously examine the walls and pick out the little blisters which have formed on the face of the plaster, and then to well wet the damaged place with water and make good with plaster, but which is not necessary in this case.

Now, you having, like a good, sociable fellow, helped me to lower my plank a couple of steps, so that I can reach halfway down from cornice to skirting, I mount my little scaffold, and once more start.

I first take a piece of partly-worn glass-paper, fine or middle 2, and lightly rub over the wall as far as my plank carries me; then with a dusting-brush and downward movement, remove any dust which has accumulated thereon. With a full brush of colour I now make a start from the right-hand extremity, and, working towards the left hand, cover about a yard in width at each shift. Carefully note, my friend, how, after taking a good dip of colour, I gently draw the brush against the side of the paint-pot, and then carry the colour to the wall with an up-ended movement, and by which simple details I avoid wasting much in transit. See also how I spread each of these brushfuls of colour with a long up and down movement, about six inches apart, and then, when they extend about three or four feet in width, how I spread it evenly over with a repeated cross-brushing action. Now it is roughly distributed, but not sufficiently fine, since the marks of the brush-hairs show very distinctly; it therefore has to be gone over again with the brush, but no more colour, first with the perpendicular, and then with horizontal brushing, and with a lighter hand each time, so that now, having finally drawn the tip of the brush down the work, starting each movement from the top and working across it still from right to left, we find the marks of the brush are not noticeable—in short, that the paint is properly "laid off." The pot is now shifted a little to the left. I again commence with laying on brushfuls, and spread and lay it off as before, until the top of one side of the wall is covered. I now descend and paint the lower half in a similar way, save that in the final laying off I finish with a light *upward* movement from skirting to the join, whereby all sign of the latter is removed.

All house painters do not spread colour on this simple but regular plan, but for good and tradesmanlike work it cannot be excelled, and is far preferable to any haphazard system—or, rather, want of system—we often may see in vogue even with professed workers.

Our painted walls must now stand for at least a day, and, meanwhile, we turn our attention to the woodwork. This, by arrangement with the builder, has been left in the white, or plain wood, with the exception of the sashes and window frames, which have to be primed before being glazed, and protected from the ill effects of wet weather before fixing.

Paint is something like charity in one respect—it covers a "multitude of sins;" and its absence on our principal woodwork has required good and well-finished doors from the contractor—which isn't always the case, even if paid for! The sooner, however, we get a coat of priming on new woodwork which is to be left in paint the better; so, after touching over any knots in the wood with one or two coats of quick-drying "patent knotting," and which article prevents the resin exuding and discolouring the work, I take some of my thin oil paint as used on the walls, and adding to it sufficient dry red lead to make it a full pink colour, prime the new woodwork. As with the wall, so with the woodwork—I first lightly rub it down with glasspaper, and carefully dust the work. Note that I paint first the edge of the door and panel mouldings, then the panels themselves from the top downwards, and finish off with the styles between panels, the top, lock, and bottom cross rails, all brushed in the direction of the grain, laying off, last of all, the outer rails, which reach from top to bottom of the entire door. Careful spreading and systematic working are just as necessary for woodwork as for wall, but whilst the latter is always laid off with the up-and-down movement, the former is finished with the grain of the wood.

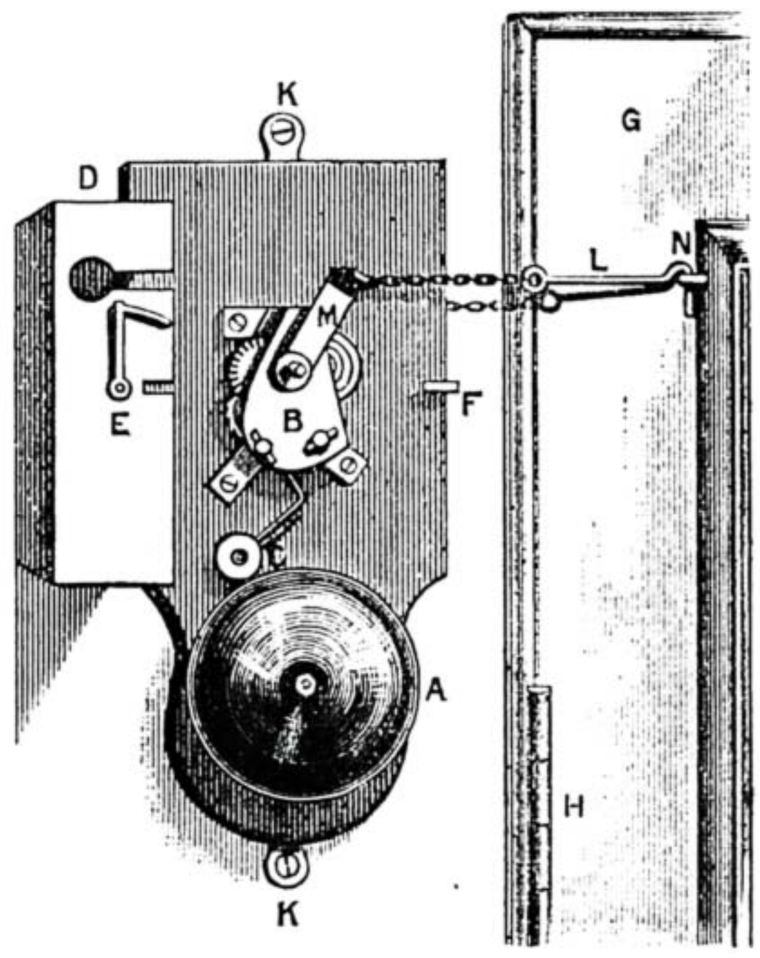
The first, or *priming*, coat being now completed to our satisfaction, we proceed to the second coating; but the consideration of this, through want of space to deal with it now, must be left for another chapter.

OUR GUIDE TO GOOD THINGS.

*** *Patentees, manufacturers, and dealers generally are requested to send prospectuses, bills, etc., of their specialities in tools, machinery, and workshop appliances to the Editor of WORK for notice in "Our Guide to Good Things." It is desirable that specimens should be sent for examination and testing in all cases when this can be done without inconvenience. Specimens thus received will be returned at the earliest opportunity. It must be understood that everything which is noticed, is noticed on its merits only, and that, as it is in the power of any one who has a useful article for sale to obtain mention of it in this department of WORK without charge, the notices given partake in no way of the nature of advertisements.*

118.—GALLEY'S PATENT DETECTIVE ALARM BELL.

THE simplicity of the Patent Detective Alarm Bell, invented and recently introduced by Mr. A. R. Galley, of Torquay, renders it a desirable means of protection for tills, and a safeguard against burglarious entrance by door or window, for all who may not care to be put to the trouble of managing and maintaining a battery suited for putting in action an electric alarm. The entire appliance is well made, and presents a neat appearance, being similar, as far as outward look is concerned, to the electric appliances just



mentioned. The bell, A, is fixed to the lower part of a baseboard, as shown in the illustration, and the mechanism, B, by which the hammer, C, is actuated, is placed above it. The works, so to speak, are covered in by a casing, D, which is attached to the baseboard by brass hooks, E, which fasten into eyes, F, one on each side. This case is shown turned on one side in the illustration in order to display the works. To make the way in which the alarm bell is to be fixed and used perfectly clear, when attached to doors it may be said that G is the upper corner of a door on the side on which it is hinged to the adjacent jamb, the top hinge being shown at H. The alarm bell is fixed to the casing of the jamb if wide enough by screws passing through glass plates, K K, screwed to the back of the baseboard, or, if not wide enough, to the wall by brass-headed nails. The wire hook, L, and the chain intervening between it and the lever, M, the chain and wire working freely through the hole and slot shown in the casing, D, should then be drawn out quite tight, bringing the lever, M, into the position shown. The hook, L, is then inserted into an eye, N, put into the door at such a distance as will allow the chain and wire to be kept as tightly strained as possible when the door is closed. On any attempt to open the door, the tension on the wire is relaxed, and the backward motion of the lever, M, sets the bell ringing. For windows the bell must be fixed at the top, and a sufficient length of chain or wire added to allow of the insertion of the hook in the eye, which must be fixed in the bottom sash. On testing the alarm I have found its action to be very satisfactory. THE EDITOR.

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SHOP:

A Corner for Those who Want to Talk It.

NOTICE TO CORRESPONDENTS.

⁂ *In consequence of the great pressure upon the "Shop" columns of* Work, *contributors are requested to be brief and concise in all future questions and replies.*

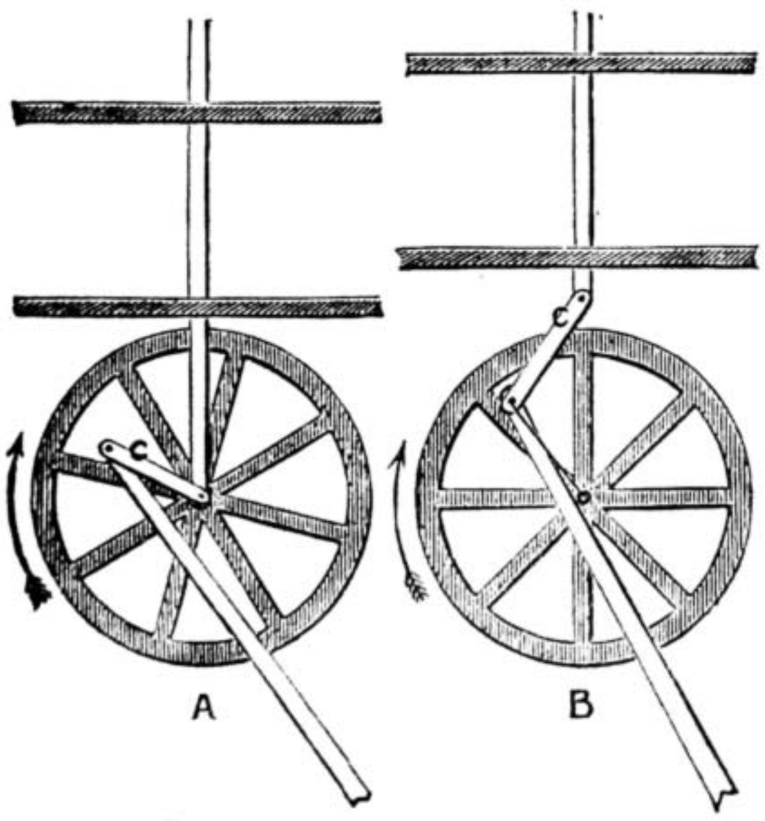
In answering any of the "Questions submitted to Correspondents," or in referring to anything that has appeared in "Shop," writers are requested to refer to the number and page of number of Work *in which the subject under consideration appeared, and to give the heading of the paragraph to which reference is made, and the initials and place of residence, or the nom-de-plume, of the writer by whom the question has been asked or to whom a reply has been already given. Answers cannot be given to questions which do not bear on subjects that fairly come within the scope of the Magazine.*

I.—Letters from Correspondents.

Boot and Shoe Making.—W. S. (*Bury*) writes in sequence to Leather (see page 492):—"I am sorry you have decided not to say anything about shoe making. I have been a subscriber to Work ever since it came out, and have derived great benefit from it. Though many would be inclined to mend their own boots, I don't think any would try their hand at tailoring or hatting. I am a married man with five children, and find it very expensive to keep all in clogs and shoes. I am able to sole my own every-day boots and clog my children's clogs, but am unable to tackle a Sunday pair to do them to look to my satisfaction, and I think if you could kindly undertake to give a paper in Work on the subject you would confer a favour on me and a great many of your readers, because I know lots in the same predicament as myself. I sometimes hear you say 'get some tradesman to help you,' but that is rather difficult. Tradesmen don't care about you knobsticking and taking away their trade to their loss and your benefit. I have been trying several months to get some one to show me how to put a bristle on a wax end, and only managed the other day from some one not in the trade. I hope you will excuse this trespass on your time, and trust you will be able to give a few words on the subject, because there are lots of wrinkles it takes an amateur a long time to find out by himself."

Printers' Varnish.—J. W. H. (*Newington Butts*) writes:—"Messrs. Stanbury & Co., West Harding Street, London, E.C., inform me that they will supply small quantities of ink to amateurs in 2-oz. tins, and upwards, at their list prices, of any colour or shade, varnish also; and will send list free by post on application. They fully confirm our statement as to the danger of burning oil, and further inform us that any one attempting it within a certain distance of London is liable to imprisonment."

An Easily-Made Fret Machine.—H. W. (*Gateshead*) writes:—"In reference to an easily-made fret machine described in Work by W. R. S. (see page 332), I notice that it is a bit of a puzzle to many readers as it was to myself. I found that the principle was right, but the drawing misleading, as to look at it you would think it would work like A in the enclosed drawing instead of like B, which, I think, W. R. S. means. I hope this will assist the puzzled ones, as with no disrespect to W. R. S., I might say that if this is not correct my machine will be wrong (not like his), for I have



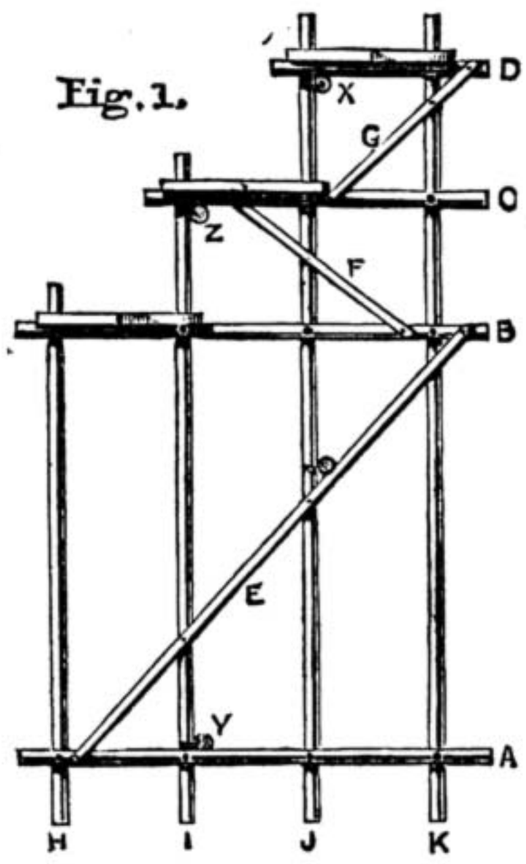
Easily-made Fret Machine.

made it like B, and find it works beautifully. I forgot to state that the throw of the machine is not measured from centre to centre of G, as W. R. S. says, but from centre of wheel to centre of crank, where it is connected with wheel."

Gas Meter Index.—E. L. R. (*Oxford*) writes:—"If you refer to Work No. 31, November 9, page 541, second column of 'Shop,' I think you will find a slight mistake. In the letter to H. N. (*Chelsea*) 'How to Read the Index of a Gas Meter,' it is put in brackets 'bear in mind that it would have to go right round to be 1,090,' which should be 1,000, I think, instead of 1,090."—[Thank you for correcting the misprint.—Ed.]

Bamboo Flower Stand for Window.—J. P. A. (*Walthamstow*) writes:—"Some time ago I, in a rash moment, offered to send a description of a flower stand I had made out of canes (garden canes I suppose they are called, as they are sold for the purpose of supporting flowers, etc., and can be

Fig. 1.



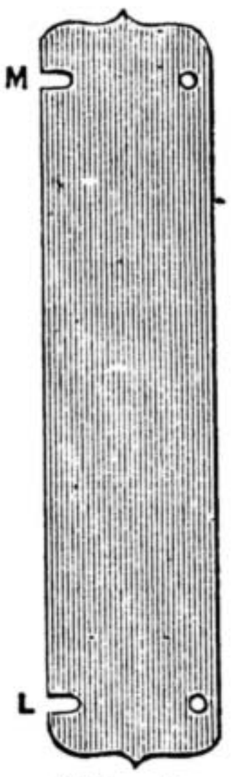


Fig. 2.

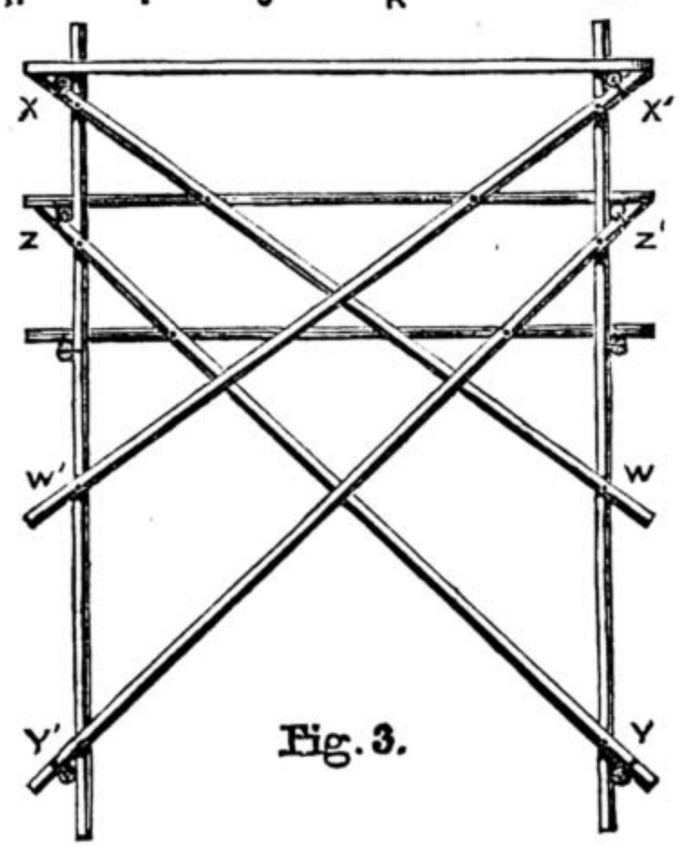


Fig. 3.

Bamboo Flower Stand for Window. Fig. 1.—End View. Fig. 2.—Shelf. Fig. 3.—Back View.

bought at seed shops, and I have seen them in oil shops). But since making that offer there have appeared several complaints about descriptions of various things not being clear enough to work from, and I have been on the side with those who have complained sometimes, though I have said nothing. Now, however, I see the difficulties of making everything quite clear when it has to be done in writing, and would suggest that you request those who cry out loudest to set to and give a description of something they have made or know well how to do. Those who now go in for a little bamboo work will not be in the same fix as I was, for I see the promised articles are commenced, and will certainly be a great help. I had decided to make some sort of a stand to put some flowers on in the window, but had not settled what it was to be, when coming across some canes I was surprised at their strength and lightness, and set about trying what could be done with them. I got a dozen about ¾ in. diameter for 9d., and a dozen ⅝ in. diameter for 4½d.; then sketched out the ends as shown in Fig. 1, and then decided on the sizes; the front shelf was put low enough for a 5-in. flower pot to be out of sight from the street; the others rise 6 in. The stoutest canes were used for uprights and horizontal pieces, and where they cross I filed notches in the uprights, and fastened them together with screws; the ⅝-in. canes were used for diagonal pieces, and were let into the horizontal ones just through one side. I tried several plans to get the holes in at the proper angle, and thought I would have to give it up, for the cane split with drill or bit, and a knife or file seemed slow work. I then tried a piece of ⅛-in. round iron, red hot, with a hole at the required angle, and just a fit (when the charred part was cleaned out), for the ¾ in. cane could be made. This tool is not mentioned by D. D.—perhaps he will give it a trial when a hole is wanted at an acute angle in a piece of bamboo—for though a rather primitive method of making holes in wood, I feel convinced that it is better than the ordinary boring tools, and much quicker than a knife or file for cane. Perhaps it will be best to give the lengths that suited my purpose, then others can suit their own. For the two ends four pieces were cut 22 in. long; they are for A and B; the two pieces for C are 16 in. long; and two, D, are 10 in. long. Then the four uprights, J and K, are 3 ft. long, and the two for I are 2 ft. 6 in. long; the two for H are 2 ft. long. These were then laid out as shown on Fig. 1, and the position of the holes for the diagonal stays marked and bored with the hot iron. The stays were then put in the holes, and all the lot fastened with screws. Having got the two ends made, the three shelves are next wanted; ½ in. stuff 7½ in. wide was used, and holes put in them a good fit for the cane; the top shelf can then be put on, but to get the other two on a piece must be cut out of the side, as shown at L, M. When the shelves are on, the stand will be pretty firm, but to make it more so, stays were put from W and W¹, to X and X¹, and from Y to Z; these pass the back of the shelves, and are screwed to them. The job is done, except the ornamenting of it, and the articles that are appearing will, I expect, give much better instructions than I can."

Linoleum Tiles for Roofing.—J. W. H. (*Newington Butts*) writes:—"In this connection Messrs. G. Glanvill & Co., Roupell Street, Blackfriars, S.E., write to me that they have a large accumulation of cuttings of well-seasoned, best quality linoleum, which they would dispose of very cheap, suitable for cutting up into tiles. They would also supply tiles ready cut, 13 in. by 6 in., 8s. 6d. per gross, or 9d. per dozen; 9 in. by 6 in., 6s. 6d. per gross, or 7d. per dozen; and 4 in. by 6 in. at 2s. 9d. per gross, or 3d. per dozen; or cut to other sizes to order at proportionate rates. Any readers at a distance should, of course, remit cash with order. With such material a roof with an occasional coating of oil would last many years."

Vulcanite.—Rapier (*Edinburgh*) writes:—"In a recent number of Work I noticed a paragraph on the casting or pressing of vulcanite in plaster moulds, which were then subjected to a heat of 310° Fahr., and continued from seventy-five to ninety minutes, being enclosed in metal cases during the process. Now this at once places it beyond the reach of any but the professional to mould in vulcanite, and I should like if some of our readers would inform me if this casting or moulding of vulcanite could not be done during the process of vulcanising, and also inform us if this making of vulcanite is a trade secret. I understand it is a mixture of india-rubber treated with sulphur. Will some one kindly explain the process, and tell me how to mould small articles in this material, or refer me to any work for the information? I have got a piece of black vulcanite, but I can make nothing of it, except by turning in the lathe, and this does not suit, as there is a great waste in turnings."

Mail Cart Wheels.—The Victor Cycle Company write:—"In your issue, No. 34, under 'Shop' heading (see page 540), you gave the addresses of firms in the North of England from whom mail cart wheels are obtainable. We beg to say that we supply a superior pair, 23½ in. rubber tired wheels, brass caps, good axles, washers, pins complete, at 5s. 6d., and believe they are the best value in the market. Ours is a convenient town for people to obtain from who are near the east coast. We notice firms you mentioned are situated near the west coast."

Handy File Holder.—Worker Bee (*Hertford*) writes:—"I have taken the war-path of criticism again, and wish first to deal with the handy file holder described by J. C. K. on page 554 of Work. The illustration given by him does not coincide with the letterpress description, nor does it give a clear idea of the utility of this tool to many

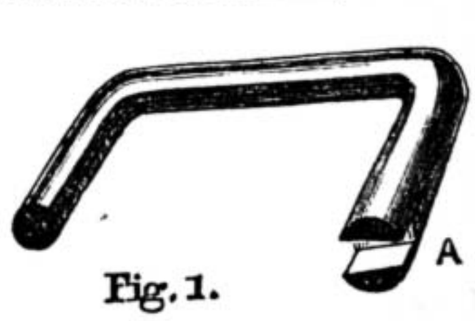


Fig. 1.

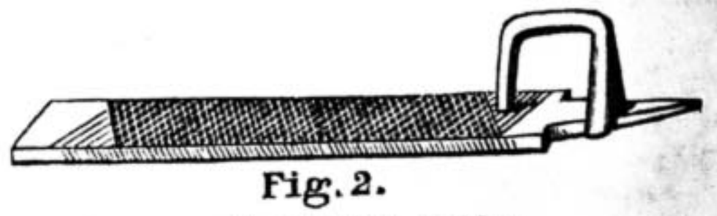


Fig. 2.

Handy File Holder.

who have not seen it in use. I have given a rough sketch of mine, which I made fifteen years ago when I worked in a large erecting shop where there were scores of them in use. Fig. 1 will show that the slot at A should be cut the same taper as the tang of the file, and not as shown by J. C. K., or you create a difficulty when, having worn one side of your file, you wish to reverse it to use the other. Fig. 2 I have given to show that a file can be used on flat surfaces of metal by the aid of this handy file holder, much as a plane can be used on wood."

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II.—QUESTIONS ANSWERED BY EDITOR AND STAFF.

Taking out a Patent.—M. T. (*Brighton*).—A paper on the above subject appears in WORK, No. 35.

Aquarium.—J. F. (*Portnall Road*).—The best material for the bottom of your aquarium will be slate cut to measure after glass is fitted in—the slate should be not less than ½ in. in thickness. The water of the aquarium, when quite full, will weigh as near as may be, 190 lbs.; add the weight of your material to this, and the result will give the weight of the whole. I know of no special appliance for filling, but for emptying use a siphon pipe, which you can make by bending up a piece of compo pipe, or a piece of stiff rubber tube will answer equally well.—C. M. W.

Small Fountain.—B. T. (*Netherton*).—If you want to keep your fountain going for so long a time as eight or nine hours, I would recommend you not to use springs, weights, or pumps, as you would find either of them clumsy and laborious. Your better plan would be to connect your aquarium to your water supply, and the overflow pipe to the drain; but if this course is inconvenient you could erect a tank at a higher level, connect with aquarium, catch the overflow in a vessel, and return it to the tank. But why not be content with the fountain playing, say, one hour at a time? You could then rig up a small tank to hold, say, a couple of gallons, suspend it over pulley wheel to ceiling, and with a cord run it up as often as required, making the connection to aquarium with flexible tubing, catching the overflow in a can, and regulating the height of jet by the height of your suspended tank above aquarium.—C. M. W.

Plumbing: Making Joints.—P. B. (*Pendleton*).—You say that you are "a plumber's apprentice, and want to learn how to make joints." The operation is described in a paper "On Soldering Joints in Metal Pipes," which you will find in page 503, *et seq.* in No. 32 of WORK.

Steel and Florentine Bronze.—J. L. (*Glasgow*).—I regret that it is not in my power to give an intelligible or satisfactory answer to the query respecting Florentine bronze. In conversation with a gentleman, who had spent some considerable time in a large works in Birmingham a few years ago, where candelabra, figures supporting lamps, etc., were made in Florentine bronze, I have learnt that this class of work was cast in what he termed stannate metal, which is of a leaden colour, and cheaper than brass. The casting was first coated with copper by electro-deposition, a dynamo supplying the necessary current; after this it was brushed over with some kind of bronze solution, and prominent parts of the surface were rubbed or burnished to give the effect of light and shade, and relieve its uniformity as suited the taste of the worker, who was a Frenchman, and very particular as to those he admitted to his workshop, the whole process being treated as somewhat of a trade secret. Evidently it requires costly apparatus and special qualifications to carry out the process.—T. R.

Bending Angle Iron.—(*Birmingham*).—The best method of bending or cranking angle and tee irons—if there are a great number required—is by pressing them in dies under the hydraulic press, but for a small number it would not pay to make the dies, and in such case you have no alternative to drawing it over a block. Some of the Welsh smiths are very clever at this work, and bend the iron without losing any of its strength.—F. C.

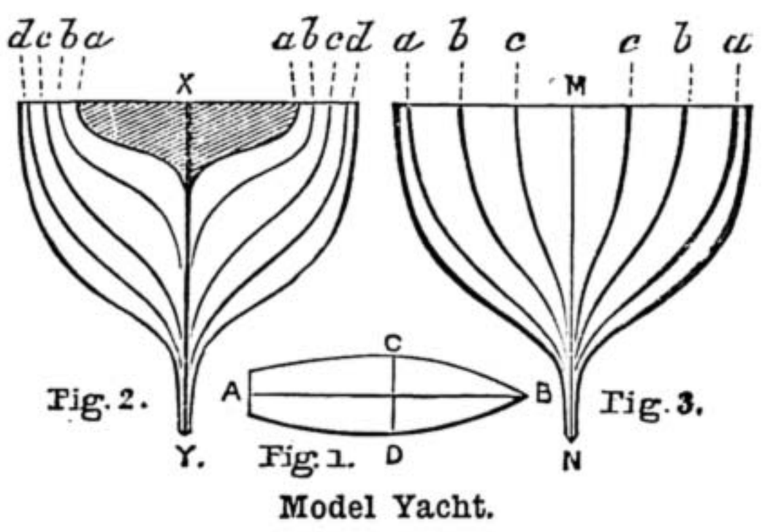
Printers' Varnish.—DURHAM.—The manufacture of varnish is not an operation that can be performed successfully without experience and without the necessary appliances. Messrs. Fleming, Caroline Park, Edinburgh; or, Mr. Horsell, 47, Meadow Road, Leeds, would, no doubt, supply a small quantity by parcels post, if applied to.—J. F. W.

Book on Loom Pattern Making.—J. P. H. (*Glasgow*).—A work on this subject is "A Practical Treatise on Pattern Making" (7s. 6d.), Lockwood and Co.—F. J. C.

Blackboards: How to Paint.—J. F. K. (*Cardiff*).—This question, or a very similar one, has been answered very recently; but as the subject appears to be one of more than individual interest, I append the best method for preparing and finishing new school blackboards. The board being quite smooth and well papered down, it must be painted with not less than three coats oil paint. The colour or shade is immaterial for the first two, but the last coating must be finished dark-lead colour, or with common black paint. You now procure ivory drop black, ground ready in turps, and mix with it some good oil varnish; best copal or carriage is as good as anything, and further dilute to working consistency with turps. The finishing black will dry hard in a few hours, and it should be without glass, otherwise the chalk will not bite on it. It would be best for a novice to try his black on the edge of a board and get it right for use, and aiming to get a good body of colour on, and for it to dry dead. The more varnish used the more gloss results, and, of course, *vice versâ*. Respecting your last item, I should say yellow pine before anything else. I might also note that an extra glue joint is better than using very wide stuff, and if you run a ⅛ in. groove at each end, ¾ in. deep—across the grain of the wood this will be—and fill in with pieces of hoop iron of similar dimensions, you will get a good and lasting job I think.—W. P.

Working of Heating Apparatus.—THE BEADLE.—If the apparatus is made to work there must be two pipes from the boiler to the tank to secure circulation, one for the hot water to ascend, and the other for the cooler water to descend to the boiler, and be reheated. You regulate the heat by increasing the rapidity of the circulation, which depends upon the rate of firing. You need not be afraid of explosion, as your tank is open to the atmosphere; this tank, I presume, is self-feeding, with a ball-cock arrangement to prevent waste. The turncocks are for running out the apparatus to clean it, for otherwise the pipes and boiler would get choked up with sediment or scale according to the quality of water you use. A gauge would be of no use to you, but a thermometer in your tank would show the lowest temperature of your water, which should not fall below 100 degrees if you have to keep the church at 60 degrees, and then you must keep the doors shut. The supply of circulating pipes appears to me very scanty, and if the boiler is not tubular you will have great difficulty, unless it is a very large one, in keeping up the temperature to the point mentioned.—F. C.

Model Yacht.—MEDICAL (*Cambridge*).—Presuming that the sections which MEDICAL has are those of a cutter model, he should work from the following lines. Fig. 1 represents the deck plan, A, B being the centre line, and C, D the line amidships, which line should cross the beam or broadest part of the hull. Fig. 2 is a section amidships, with X, Y, sternpost, which, with the two sections *a* and *b*, are the only lines MEDICAL has to work from. There being no mathematical rule for arriving at the correct curves for the various pairs of ribs, the only way of proceeding is to decide on the shape of hull you intend working from, and to mould your



Model Yacht.

ribs to fit accordingly. The first pair for a cutter should be bent to the form of section *b*, Fig. 2, the second pair as section *c*, and the third as section *d*. If the lines are intended for a schooner model, the greater proportion of the length to the breadth of the hull will necessarily make the curves of the ribs less full than those of a cutter, but in all other respects the same lines will do for either. The above lines are the only ones for which MEDICAL asks, but I take it that he also requires the intermediate curves for the ribs between the beam and cutwater, which are shown in Fig. 3, M, N being the cutwater, and the thick curves section at beam. The ribs should be at intervals of ⅛ of the length of the hull, although if the model be a very large one, it will require the ribs to be placed closer, and of course a larger number of them, but this can easily be deduced from the above diagrams. I should warn MEDICAL, however, that he has chosen the most difficult way to build a model, and unless he is proficient in this kind of work, he will succeed better in one of the simpler methods.—G. J. E.

Bunsen Battery for Electric Light.—A. H. T. (*Padiham*).—As the voltage of 5-candle-power incandescent lamps varies from 5 volts to 65 volts, it follows that I cannot answer your questions satisfactorily, since I do not know the voltage of your lamp. The number of Bunsen cells required to light a 5-c.p. lamp will depend upon the voltage of the lamp. If an 8-volt lamp, then 4 quart Bunsen cells will be enough if arranged in series. Find out the voltage of the lamp, and divide the figures by 1·86; the answer will give you the number of cells in series required to light the lamp.—G. E. B.

Magnetising Steel Articles.—ANXIOUS (*Liverpool*).—See reply to V. R. (*Liverpool*) on Demagnetisation. Wind five layers of No. 18 cotton-covered copper wire in a hollow bobbin, having a thin papier-mâché tube for a body, and fill this with the steel articles to be magnetised. Send a current from 4-quart Bunsen cells through this coil, and proceed as advised to V. R. for magnetising his bars.—G. E. B.

Steel Castings.—T. T. (*Newport*).—You will not get any information as to the making of steel castings from books, nor from any source except that of actual occupation in a steel foundry. This branch of trade is very exclusive. The making of good steel castings lies in the hands of a few firms only, who having achieved success through many failures, are jealous of giving others the benefit of their costly knowledge. Hence neither employers nor workmen will reveal their trade secrets, and those who, like the writer, have been permitted in the way of trade to observe the methods and processes followed in the steel foundries, feel bound in honour to say nothing. To understand steel moulding you must obtain work in a steel foundry, a difficult thing to do unless you know some one who might assist you in this respect. In reply to your other specific queries: The differences between moulding in iron, in steel, and in malleable iron are—steel has to be run at a much higher temperature than cast iron, and the moulds are, therefore, more refractory. Ganister is used, and ground crucibles, and they are faced with a tarry mixture, and dried so hard that you can stand upon them without breaking them, a thing impossible in green or dried sand moulds for iron. Then to prevent honeycombing, the castings are poured with large "heads;" and to prevent fracture due to the much higher percentage of shrinkage in iron than in steel, all sharp angles are avoided, curves, hollows, and brackets being inserted, whether required in the finished casting or no. The castings are annealed in malleable iron; the moulds are the same as in cast iron, but the castings are not poured from grey iron, but from white which contains no graphite, and the runners are not round, but flat and thin, to prevent shrinkage and fracture in their vicinity. After the castings are made they are decarbonised in pots, in contact with hematite iron ore. In malleable castings the metal is melted in cupolas; steel is melted in pot furnaces, or if in large quantities, in the Bessemer converter, or more usually in the Siemens open hearth furnace. The composition of Sheffield ganister is as follows:—Silica, 89·01; alumina, 5·44; ferric oxide, 2·65; lime, 0·31; magnesia, 0·17.—J.

American Clock Cleaning.—A LOVER OF "WORK" (*London, E.C.*).—See that the balance swings perfectly clear of everything, that the pin working in the notch of lever when passing in or out of the notch is quite clear, that the scape teeth falls fair on the square, or dead part of the pallets, that it is quite in beat, and swings nearly a turn; if more it will strike the banking, and so gain; if less it will vary; you will probably find that one or other of the above is wrong; see also that hair-spring is free between the pins or loop. I am rather afraid you have not got it in beat, and that it swings round and strikes the banking. Listen, and if it gives a kind of double tick, that is the cause. To put it in beat, take the power off scape wheel, and when the balance is at rest, the pivot of scape wheel, the balance pivot, and the pin in the notch should be exactly in line. See also that all pivots and scape teeth are oiled, but not the pin working the pallets. If no better, write again.—A. B. C.

Screen Escritoire.—F. A. F. (*Islington*).—With reference to your query for the screen escritoire, if the American white wood be the sort I know by that name, I think wood ¾ in. thick would suffice for the sides. For the two long feet that keep the whole structure steady it is hard to give dimensions. I feel inclined to advise you to make them just as long as you can without giving an unsightly appearance to the whole thing, or making the feet project so as to bring disaster upon unwary passers-by. In the original which gave the motive for the adaptation, the one weak part was this that you have noticed. I feel inclined to repeat the advice of a bookcase backing it, for if any one knows a heavier thing in nature than three or four shelves of ordinary literature, whether theology or fiction, they carefully guard the miserable secret.—G. W.

Overmantel, Dimensions of.—F. J. W. (*Wallington*).—The measurement given for the overmantel, 4½ in. inclusive, is correct. If F. J. W. will try the width, he will see that 7 in. would be much too heavy. The design being in exaggerated perspective conveys a slightly untrue effect, for I have the structure in daily use, and can endorse the figures given. The shelf, marked K, is rounded on its under edge because it projects (which the others do not), and is a finish to the whole thing. Certainly add back to the cupboard. I rather object to doing so for the under portion as well, but it is of small moment. The effect of the whole is more pleasing than it appears in the engraving, where effect was sacrificed for clear explanatory diagrams. The bric-à-brac, which the engraver added, is also a wonder and a wild surprise to the designer, who certainly intended to suggest genuine native pottery—not the Lowther Arcadian horrors which somebody has substituted. But these groans only escape to show that even those who make the designs find the interpretation not quite clear, so can readily sympathise with outside queries.—J. G.-W.

Area of Ball.—FABER.—I suppose you require the surface of the ball: it is found by multiplying the square of the diameter by 3·1416; thus if the ball is 3½ in. diameter, its surface is 3·5×3·5×3·1416 =38·4846 square inches.—F. C.

Loose Spokes in Bicycle Wheels.—CARPENTER.—The four spokes are probably stripped in the screw. Repairers have a trick of hammering the screwed part of a spoke on an anvil, thereby flattening the end and broadening the screwed part, which often makes it take a hold in the hub, but it is a clumsy expedient and a lazy one. The proper way is to put in such spokes a size thicker, with the holes in the hub tapped afresh one size larger, or spokes the same thickness, but with the ends butted or thickened to screw a size or so larger than the old ones; or, if the screwing in the hub is uninjured, new spokes of the same thickness as the old ones will do. There is a small tool called a spoke grip sold by all the cycle dealers and makers for about 1s. 6d. This tool will screw or unscrew any size of spoke.—A. S.

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Some Facts about Mahogany.—H. H. (*Liverpool*).—I am glad you liked Mr. Denning's paper on this subject. I daresay he will furnish similar articles on other woods used in cabinet making before long.

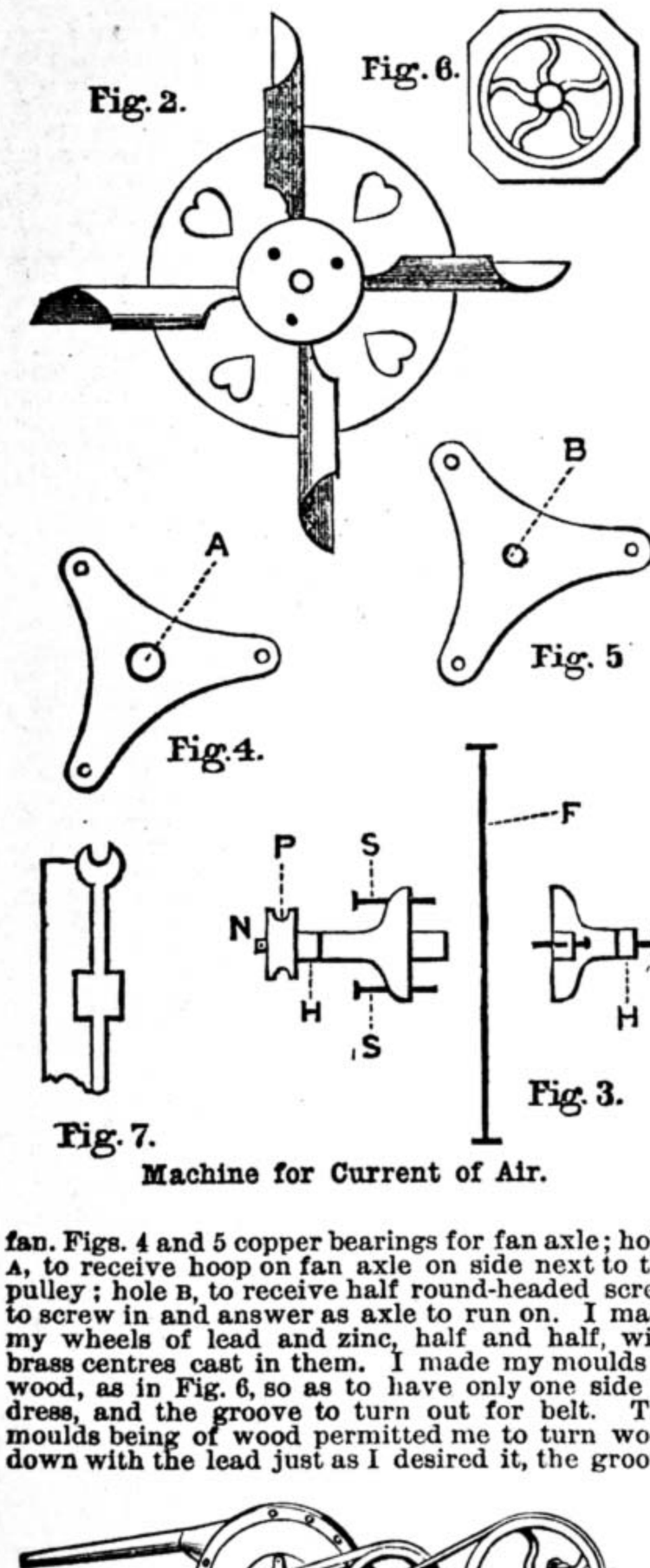
Numbers in Volume of WORK.—CARPE DIEM.—There will be fifty-two numbers in each volume of WORK.

Cheap Camera.—CARPE DIEM.—The camera you mention is good value for what is asked for it.

Honey Extractor.—J. J. BEE.—Your query relative to a honey extractor has been answered. There will be a paper on construction of apiarian appliances by-and-by.

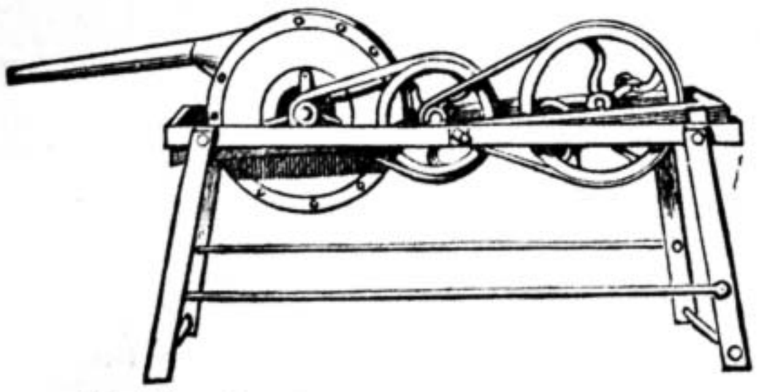
IV.—QUESTIONS ANSWERED BY CORRESPONDENTS.

Machine for Current of Air.—CABINET MAKER (*Allendale*) writes in reply to BELLOWS (*Gloucester*), (see page 109):—"I enclose sketch of machine of my own invention which BELLOWS may easily make, as I found little trouble with it. The machine complete, as shown in Fig. 1, is 2 ft. 4 in. long, 8 in. wide, and 17½ in. high. Fig. 2 is a tin fan or blower, Fig 3 is axle of blower made of wood with brass hoop on each end, H; P, pulley fixed with half round-headed screw nail, N; S, screws to screw wood axle together after fan is fixed between; F,



Machine for Current of Air.

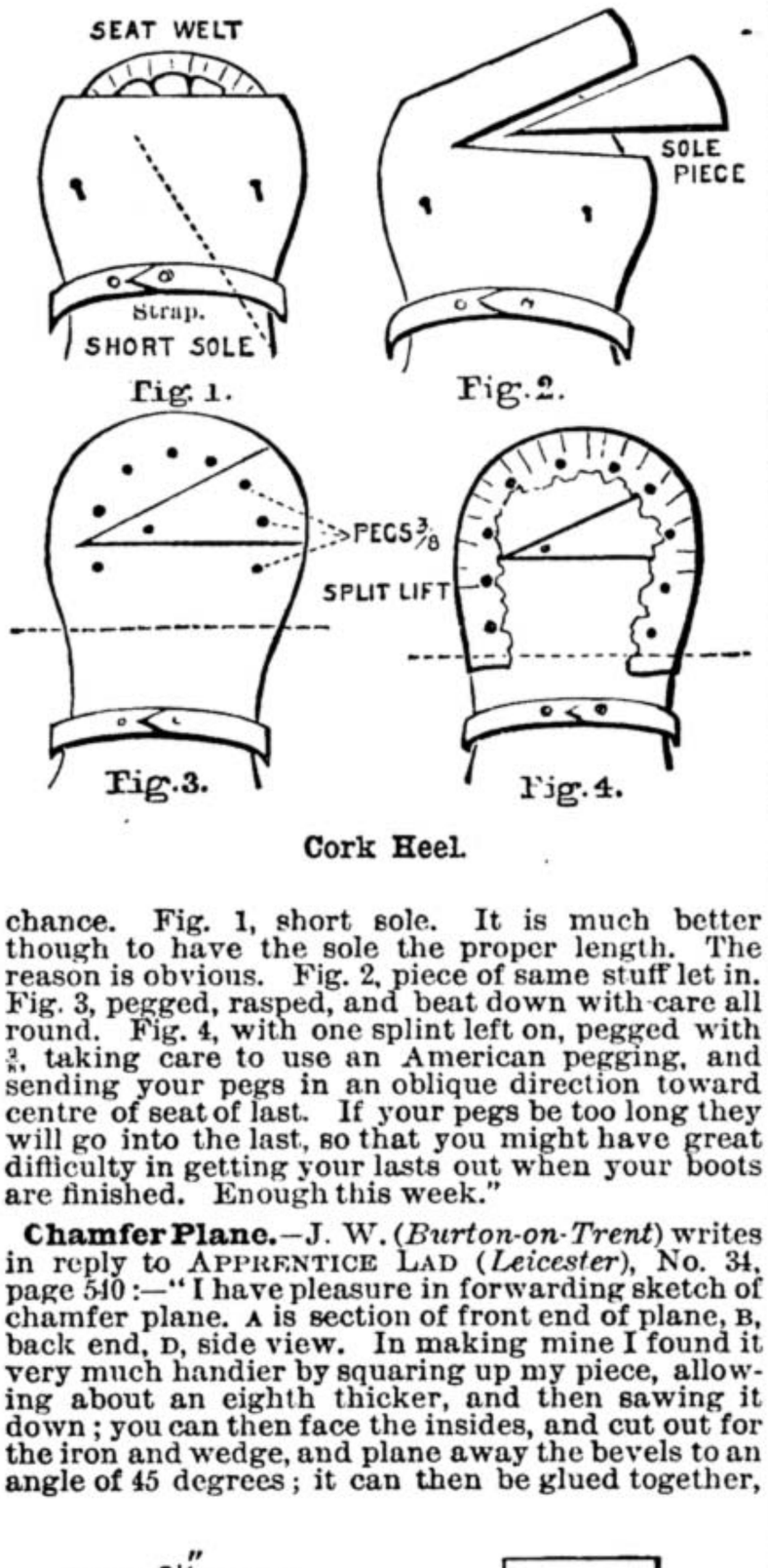
fan. Figs. 4 and 5 copper bearings for fan axle; hole, A, to receive hoop on fan axle on side next to the pulley; hole B, to receive half round-headed screw to screw in and answer as axle to run on. I made my wheels of lead and zinc, half and half, with brass centres cast in them. I made my moulds of wood, as in Fig. 6, so as to have only one side to dress, and the groove to turn out for belt. The moulds being of wood permitted me to turn wood down with the lead just as I desired it, the groove



Machine for Current of Air complete.

as shown in Fig. 7 being turned out last. It will be seen in Fig. 1 that the frame in which fan box and wheels are placed is working on two thumb screws, which pass through sides of the stand, to which fan box, etc., is fixed, so that the fan pipe can be lowered or raised to suit any height of fire as may be required, the thumb screws when screwed tight holding it firm to position required. The fan box is of sheet iron, 10 in. diameter inside by 2¼ wide, fan or blower running at the rate of 2,560 revolutions per minute, the frame of 1 in. wood with stout ends to prevent warping; the stand of ¼ in. iron. The whole is painted in five colours, which makes it handsome enough to stand in any room. Should BELLOWS want more particulars I shall be glad to assist him in any way I can, or should he care to buy it I can sell it cheap, as it is perfectly new and of no use to myself. I only made it to keep my hand in."

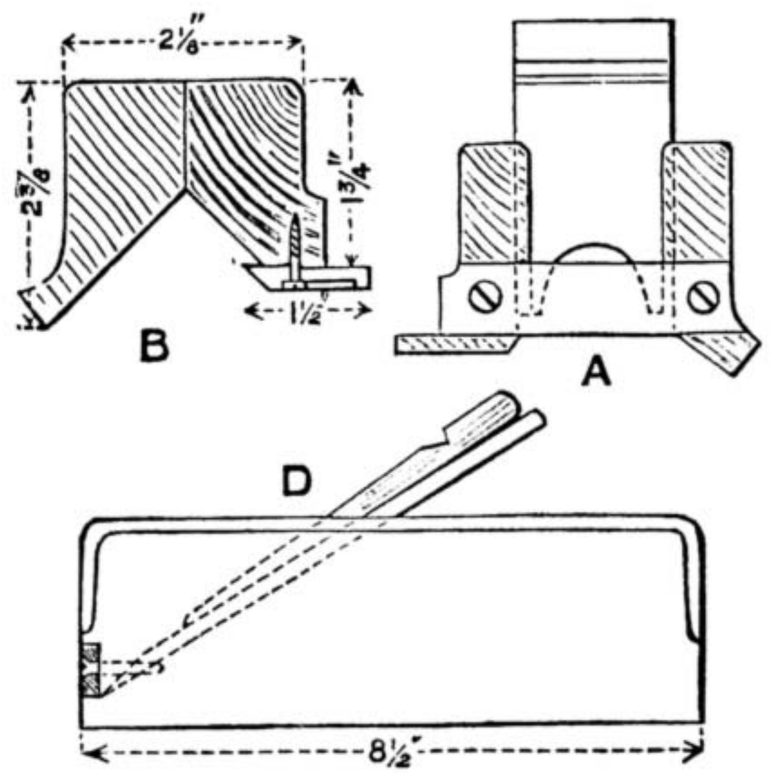
Cork Heel.—NITRAM writes in answer to J. R. (see page 526):—"I must confess that I am at a loss to grasp the whole meaning intended in some parts of his query. I presume you mean by a cork heel a particular shape of heel? If so, I am not cognisant of the term. To answer all your questions correctly would take up more space in 'Shop' than I could reasonably expect our Editor to grant. So with a few rough sketches I will attempt part this week and part later on, and so give all a



Cork Heel.

chance. Fig. 1, short sole. It is much better though to have the sole the proper length. The reason is obvious. Fig. 2, piece of same stuff let in. Fig. 3, pegged, rasped, and beat down with care all round. Fig. 4, with one splint left on, pegged with ⅜, taking care to use an American pegging, and sending your pegs in an oblique direction toward centre of seat of last. If your pegs be too long they will go into the last, so that you might have great difficulty in getting your lasts out when your boots are finished. Enough this week."

Chamfer Plane.—J. W. (*Burton-on-Trent*) writes in reply to APPRENTICE LAD (*Leicester*), No. 34, page 540:—"I have pleasure in forwarding sketch of chamfer plane. A is section of front end of plane, B, back end, D, side view. In making mine I found it very much handier by squaring up my piece, allowing about an eighth thicker, and then sawing it down; you can then face the insides, and cut out for the iron and wedge, and plane away the bevels to an angle of 45 degrees; it can then be glued together,



Chamfer Plane.

care being taken that they are exactly in place. The mouth is formed by a piece of iron or steel, about ⅜ in. by ¼ in. let in flush, and screwed on as shown. I used a broken 1½ in. chisel for an iron, which answers very well. The fence is secured by two screws, sunk in on slotted brass plates similar to a side fillister; the pitch of the iron should be more than 30 degrees."

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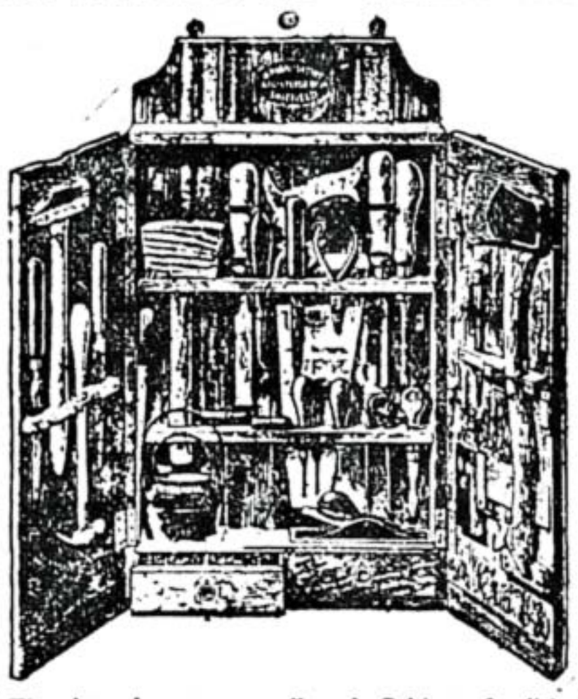

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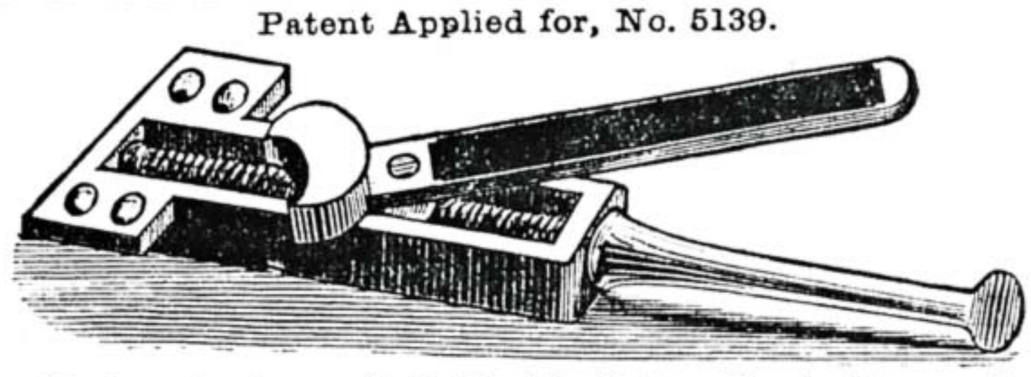

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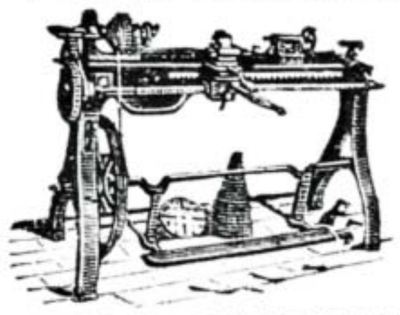

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